



Operation and Maintenance Manual

**216, 226, 228, 232, 236, 242, 246, 248,
252 and 262 Skid Steer Loaders**

CAB1-Up (Machine)
CMB1-Up (Machine)
CED1-Up (Machine)
FDG1-Up (Machine)
4NZ1-Up (Machine)
4YZ1-Up (Machine)
5FZ1-Up (Machine)
5SZ1-Up (Machine)
6BZ1-Up (Machine)
6LZ1-Up (Machine)

i02418858

Maintenance Interval Schedule

SMCS Code: 7000

Ensure that all safety information, warnings and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, **WHICH EVER OCCURS FIRST**, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

When Required

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Every 10 Service Hours or Daily

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Tire Inflation - Check	132
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Work Tool - Lubricate	135
Work Tool Mounting Bracket - Inspect	137

Every 250 Service Hours

Engine Oil Sample - Obtain	117
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Every 250 Service Hours or Monthly

Belts - Inspect/Adjust/Replace	102
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Every 500 Service Hours

Hydraulic Oil Sample - Obtain	124
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Every 500 Service Hours or 3 Months

Drive Chain Tension - Check/Adjust	110
Fuel System Primary Filter (Water Separator) Element - Replace	121

Every 500 Service Hours or 6 Months

Fuel System Filter - Replace	120
Hydraulic System Oil Filter - Replace	125

Every 500 Service Hours or 1 Year

Engine Oil and Filter - Change	117
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Every 1000 Service Hours

Engine Valve Lash - Check	120
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Every 1000 Service Hours or 6 Months

Drive Chain Case Oil - Change	110
Engine Crankcase Breather - Clean	115
Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) - Inspect ...	130

Every 1000 Service Hours or 1 Year

Hydraulic System Oil - Change	124
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Every 2000 Service Hours

Refrigerant Dryer - Replace	130
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Every 2000 Service Hours or 1 Year

Fuel Injection Timing - Check	120
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Every 2000 Service Hours or 1 Year

Fuel Injection Timing - Check	120
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Every 3000 Service Hours or 2 Years

Cooling System Coolant Extender (ELC) - Add ..	107
Cooling System Water Temperature Regulator - Replace	109

**Every 3 Years After Date of Installation or
Every 5 Years After Date of Manufacture**

Seat Belt - Replace	132
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Every 5000 Service Hours

Engine Crankcase Breather (Closed Circuit) - Replace	115
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Every 6000 Service Hours or 4 Years

Cooling System Coolant (ELC) - Change	106
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Backup Alarm - Test

SMCS Code: 7406-081

To prevent injury, make sure that no people are working on the machine or near the machine. To prevent injury, keep the machine under control at all times.

1. Get into the operator's seat. Fasten the seat belt and pull the armrest downward.
2. Start the engine.
3. Disengage the parking brake.
4. Move the speed/direction control lever to the REVERSE position.

The backup alarm (if equipped) should sound immediately. The backup alarm should continue to sound until the speed/direction control lever is returned to the HOLD position or to the FORWARD position.

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Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i01719520

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-040; 1401-510; 1401-561; 1402-040; 1402-510

1. Turn the engine start switch to the OFF position. Turn all switches to the OFF position.
2. Disconnect the negative battery cable from the starter.

Note: Do not allow the disconnected battery cable to contact the frame of the machine.

3. Disconnect the negative battery cable at the battery.
4. Perform the necessary repairs. Replace the cable or the battery, as needed.
5. Connect the negative battery cable at the battery.
6. Connect the battery cable to the starter of the machine.
7. Install the engine start switch key.

Repeat the process for the positive battery cable.

i01957641

Belts - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510

If a new belt is installed, check the belt adjustment after 30 minutes of operation. A belt is considered to be used after 30 minutes of operation.

1. Stop the engine in order to inspect the belt.
2. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

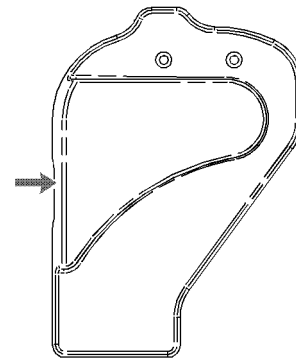


Illustration 132

g01017605

3. Remove the guard for the V-belt.

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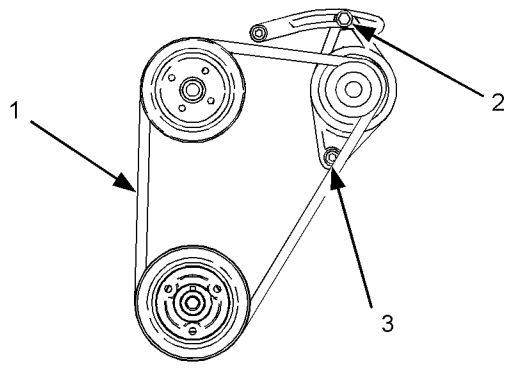


Illustration 133

g01017632

4. Inspect the condition of the belt (1) and the adjustment of the belt. The belt should deflect 10 mm (0.39 inch) under a straight pull of 44 N (10 lb). This measurement should be taken between the alternator pulley and the crankshaft pulley.

Note: A 144-0235 Borroughs Belt Tension Gauge may be used to measure belt tension. This measurement should be taken between the alternator pulley and the crankshaft pulley. Refer to the following table for belt tension.

Table 31

Belt Tension Initial	Belt Tension Used
534 ± 22 N (120 ± 5 lb)	400 ± 44 N (90 ± 10 lb)

5. Loosen the mounting bolt (2). Loosen the adjusting locknut (3).
6. Move the alternator until the correct tension is reached.
7. Tighten the adjusting locknut. Tighten the mounting bolt.
8. Recheck the belt deflection. If the amount of deflection is incorrect, repeat step 4 to step 7.
9. Install the guard for the V-belt.
10. Close the engine access door.

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Lower the lift arms fully. Tilt back the bucket so that the bucket cutting edge is accessible.
2. Place blocks under the raised edge of the bucket.
3. Remove the bolts. Remove the cutting edge and the end bits.
4. Clean the contact surfaces.
5. Use the opposite side of the cutting edge, if this side is not worn.
6. Install a new cutting edge, if both edges are worn.
7. Install the bolts.
8. Remove the blocks that are under the bucket.
9. After a few hours of operation, check the bolts for proper torque.

i01764331

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Lower the lift arms fully. Tilt back the bucket so that the bucket tips are accessible.
2. Place blocks under the raised edge of the bucket.
3. Remove the mounting bolts. Remove the bucket tips.

4. Clean the mounting surface.
5. Replace the bucket tips.
6. Install the bolts.
7. Remove the blocks that are under the bucket.
8. After a few hours of operation, check the bolts for proper torque.

i01962545

Cab Air Filter - Clean/Replace (If Equipped)

SMCS Code: 7342-070; 7342-510

Fresh Air Filter

1. Raise the loader lift arms. Install the brace for the loader lift arm. Refer to Operation and Maintenance Manual, "Loader Lift Arm Brace Operation".

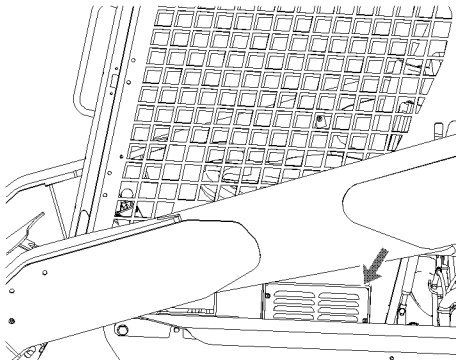


Illustration 134

g01019732

2. Remove the filter cover.
3. Remove the seal from the cover and inspect the seal. If the seal is damaged replace the seal.
4. Remove the air filter element from the cover and clean the filter element with low pressure air. Replace the element if the element is damaged.
5. Install the seal onto the filter cover and install the filter element.
6. Install the filter cover on the machine.
7. Remove the brace for the loader lift arms and return the brace to the stored position. Refer to Operation and Maintenance Manual, "Loader Lift Arm Brace Operation".

Recirculation Filter

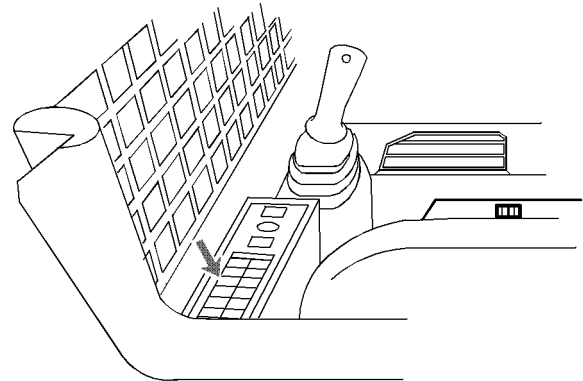


Illustration 135

g01024691

1. Remove the cover in order to access the air filter element.
2. Remove the air filter element and clean the element with soap and water. Replace the element if the element is damaged.
3. Install the element and replace the cover.

i01584243

Circuit Breakers and Fuses - Reset/Replace

SMCS Code: 1417-510; 1420-529

Fuses – Fuses protect the electrical system from damage that is caused by overloaded circuits. Replace the fuse if the element separates. If the element of a new fuse separates, check the circuit. Repair the circuit, if necessary.

NOTICE

Replace the fuses with the same type and size only. Otherwise, electrical damage can result.

If it is necessary to replace fuses frequently, an electrical problem may exist. Contact your Caterpillar dealer

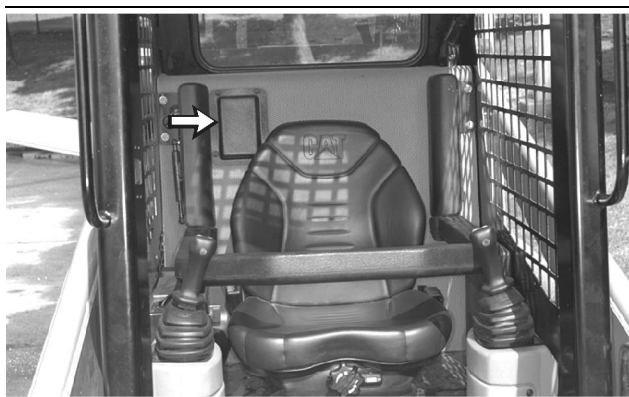


Illustration 136

g00521606

Remove the cover for the fuse panel.

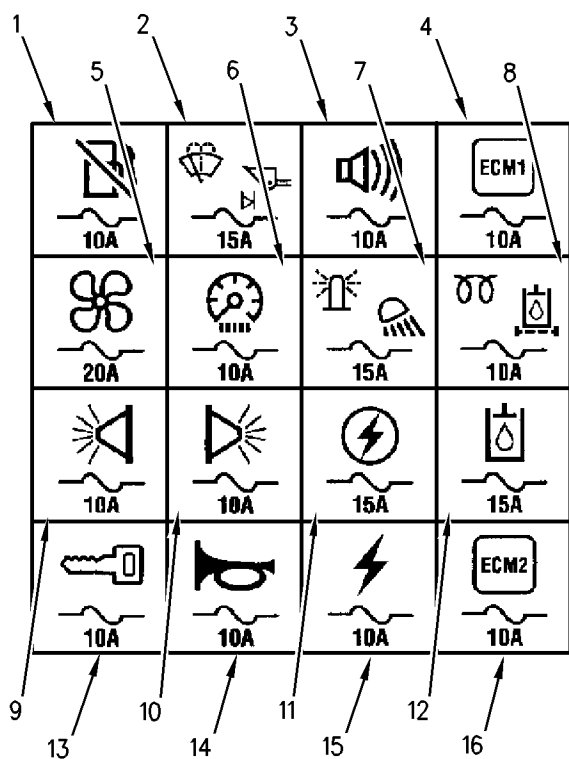


Illustration 137

g00821897

Type 1

- (1) Fuel Shutoff
- (2) Wiper
- (3) Backup Alarm
- (4) Interlock Control
- (5) Heater
- (6) Gauges
- (7) Lights and Beacon
- (8) Cold Start and Hydraulic Filter
- (9) Left Tail Lamp
- (10) Right Tail Lamp
- (11) Auxiliary tools
- (12) Fourth Function
- (13) Key Switch
- (14) Horn
- (15) Miscellaneous Power
- (16) Auxiliary Hydraulic Control

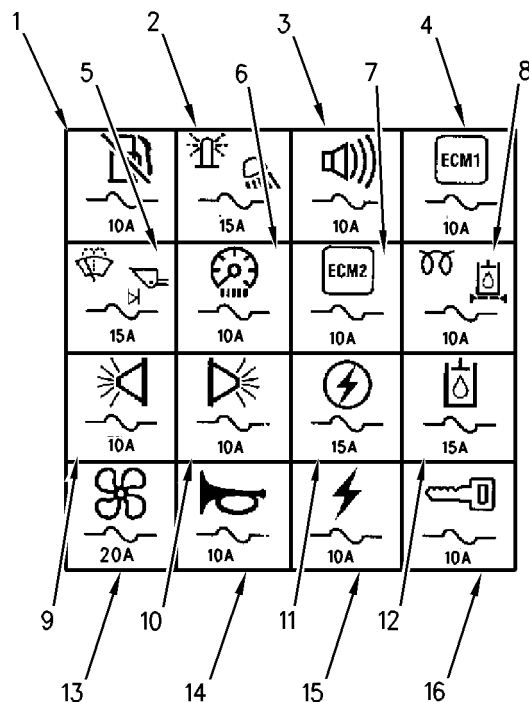


Illustration 138

g00793941

Type 2

- (1) Fuel Shutoff
- (2) Rear Flood Lamps
- (3) Backup Alarm
- (4) Interlock Control
- (5) Wiper
- (6) Gauges
- (7) Auxiliary Hydraulic Control
- (8) Cold Start and Hydraulic Filter
- (9) Left Tail Lamp
- (10) Right Tail Lamp
- (11) Auxiliary tools
- (12) Fourth Function
- (13) Heater
- (14) Horn
- (15) Miscellaneous Power
- (16) Key Switch

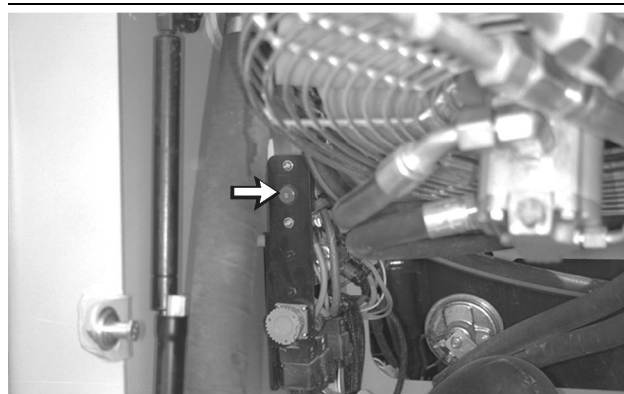


Illustration 139

g00541350

The main circuit breaker is located in the engine compartment on the left side.

i01685306

Cooling System Coolant (ELC) - Change

SMCS Code: 1395-044-NL

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

NOTICE

Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants and Caterpillar Extender.

Note: The machine was shipped from the factory with Extended Life Coolant (ELC) in the cooling system.

For information about the addition of Extender to your cooling system, see the Operation and Maintenance Manual, "Cooling System Extended Life Coolant Extender - Add" or consult your Caterpillar dealer.

NOTICE

Do not change the coolant until you read and understand the material in the Cooling System Specifications section.

Drain the coolant whenever the coolant is dirty or whenever the coolant is foaming.

The radiator cap is located under the radiator guard on the top of the engine compartment.

Allow the machine to cool before you change the coolant.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

2. Remove the retaining pin for the radiator guard. Raise the radiator guard. Refer to Operation and Maintenance Manual, "Radiator Tilting".



Illustration 140

g00522611

3. Slowly loosen the radiator cap in order to relieve system pressure. Remove the radiator cap.

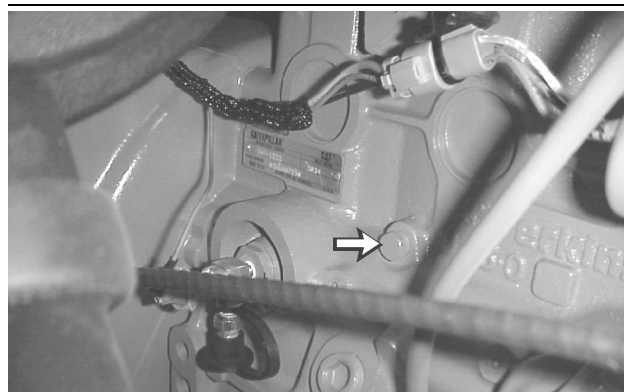


Illustration 141

g00582375

Type 1

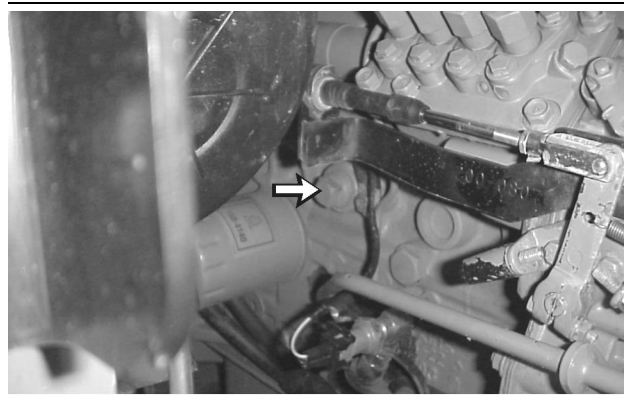


Illustration 142

g005821964

Type 2

4. The drain plug for the coolant is located on the left side of the engine block. Remove the drain plug and allow the coolant to drain into a suitable container.

i01896556

5. Install the drain plug.
6. Replace the thermostat. See Operation and Maintenance Manual, "Cooling System Water Temperature Regulator - Replace" for the process for replacing the thermostat.
7. Add the coolant solution. Refer to Operation and Maintenance Manual, "Refill Capacities". Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations".

Note: Premix the coolant solution before filling the cooling system. The coolant solution should contain 50 percent coolant and 50 percent distilled water.

Note: Add the coolant solution at a maximum rate of five liters per minute. This will reduce the chance of trapping air inside the engine block. A large amount of trapped air can cause localized heating to occur upon start-up. Localized heating may result in engine damage, which may lead to failure of the engine.

8. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes.

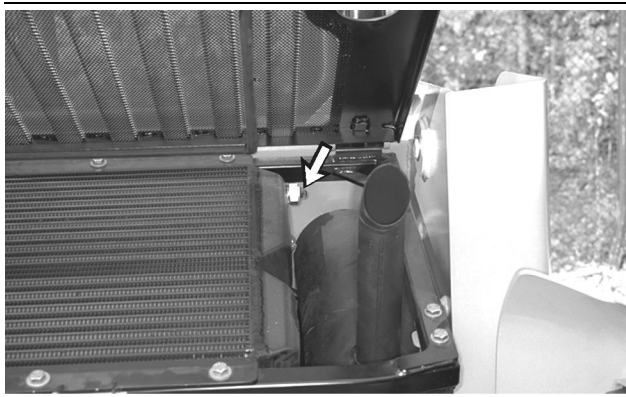


Illustration 143

g00535489

9. Maintain the coolant level in the sight gauge. The sight gauge is located on the right side of the radiator.
10. Stop the engine. Inspect the radiator cap and the gasket. Replace the cap if the cap or the gasket is damaged. Install the radiator cap.
11. Pull the radiator guard downward and install the retaining pin.
12. Remove the retaining pin for the engine access door from the locked position and place the pin in the stored position. Close the engine access door.

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

When a Caterpillar Extended Life Coolant is used, an extender must be added to the cooling system periodically.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Tilt the radiator guard upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".

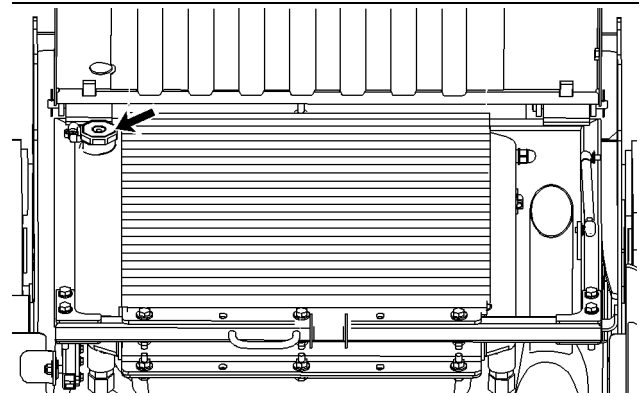


Illustration 144

g00956151

3. Slowly loosen the radiator cap in order to relieve system pressure. Remove the radiator cap.
4. If necessary, drain enough coolant from the radiator in order to allow the addition of the coolant additive.
5. Add 0.17 L (0.18 qt) of cooling system additive.
6. Inspect the radiator cap and the gasket. If the cap or the gasket is damaged, replace the cap. Install the radiator cap.

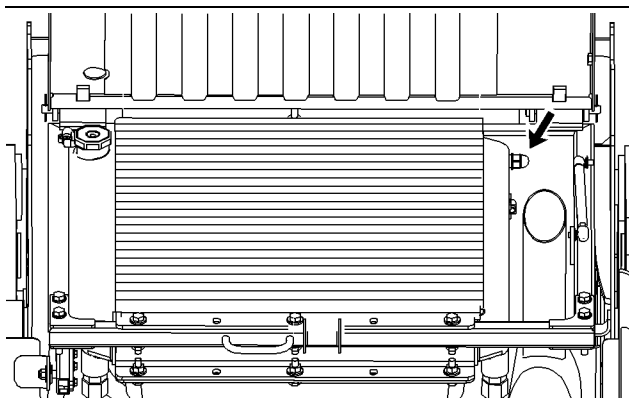


Illustration 145

g00956179

7. Check the coolant level in the sight gauge on the radiator. The sight gauge is located on the right side of the radiator. Maintain the coolant level to the top of the sight gauge with the radiator in the LOWERED position.
8. Tilt the radiator guard downward.
9. Close the engine access door.

For additional information on the addition of extender, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations".

i01874850

Cooling System Level - Check

SMCS Code: 1350-040-HX; 1350-535-FLV;
1382-070; 1382-510

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Tilt the radiator guard upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".

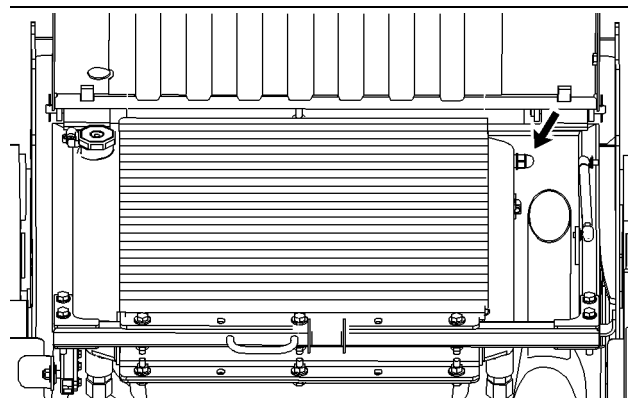


Illustration 146

g00956179

3. Maintain the coolant to the top of the sight gauge with the radiator in the LOWERED position. The sight gauge is located on the right side of the radiator.

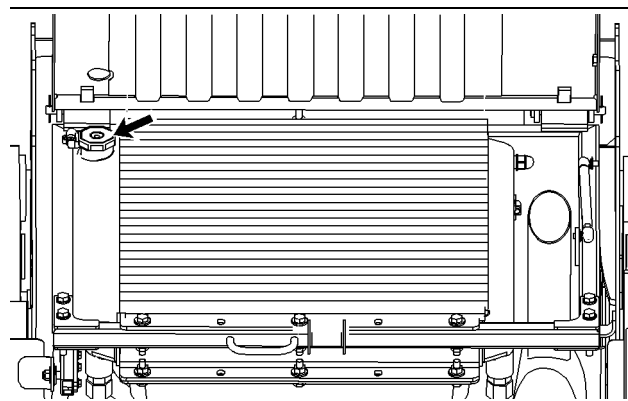


Illustration 147

g00956151

4. If you need to add coolant to the radiator, the radiator cap is located on the upper left corner of the radiator. Remove the radiator cap slowly in order to relieve system pressure.

Note: Inspect the cooling system hoses for any leaks, cracks, or signs of deterioration. Replace any damaged hoses.

5. Inspect the radiator cap and the gasket. Replace the cap if the cap or the gasket is damaged. Install the radiator cap.
6. Tilt the radiator guard downward.

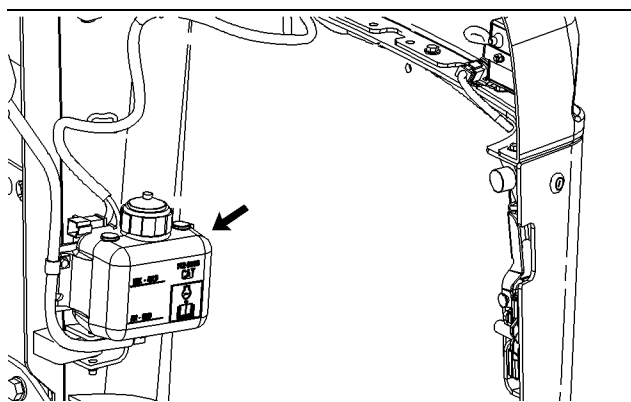


Illustration 148

g00954176

7. Maintain the coolant level in the coolant reservoir between the "MIN" and "MAX" lines on the reservoir tank.
8. Close the engine access door.

i01584466

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

Replace the thermostat on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system. Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

The thermostat should be replaced after the cooling system has been cleaned. Replace the thermostat while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

Caterpillar engines incorporate a shunt design cooling system. It is mandatory to always operate the engine with a thermostat.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Drain the coolant from the machine. See Operation and Maintenance Manual, "Cooling System Coolant (ELC) - Change" for the procedure to drain the cooling system.

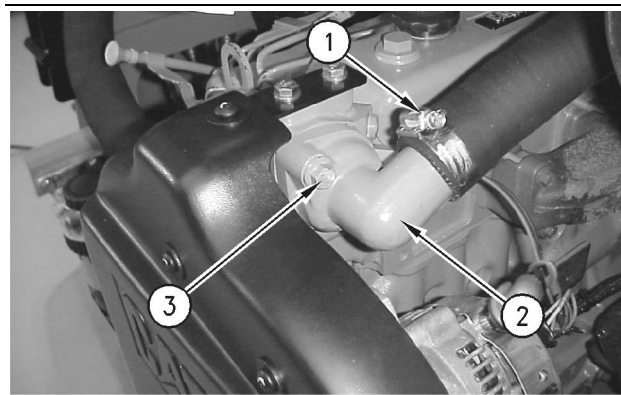


Illustration 149

g00752450

Type 1

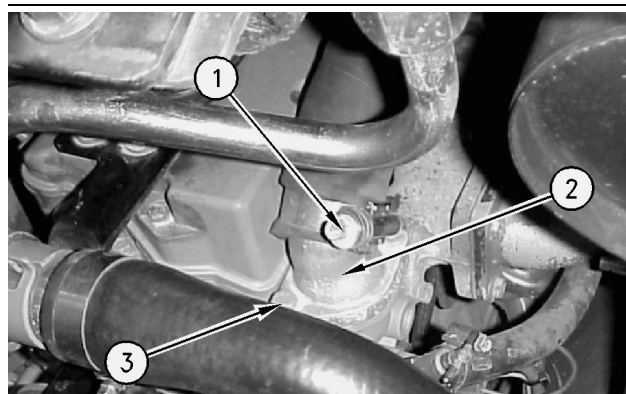


Illustration 150

g00821973

Type 2

3. Loosen the hose clamp (1) and remove the hose from the thermostat housing assembly (2).
4. Remove the two bolts (3) from the thermostat housing assembly. Remove the thermostat housing assembly.
5. Remove the gasket and the thermostat from the thermostat housing assembly.
6. Install a new thermostat and a new gasket. Install the thermostat housing assembly on the engine cylinder head.
7. Install the hose. Tighten the hose clamp. See Operation and Maintenance Manual, "Standard Torque for Worm Drive Band Hose Clamps" for the proper torque.
8. Refill the cooling system. See Operation and Maintenance Manual, "Refill Capacities". Refer to Operation and Maintenance Manual, SEBU6250, "Cooling System Specifications" for coolant information.
9. Close the engine access door.

i01990833

Drive Chain Case Oil - Change

SMCS Code: 3261-543-OC; 3261-544-OC

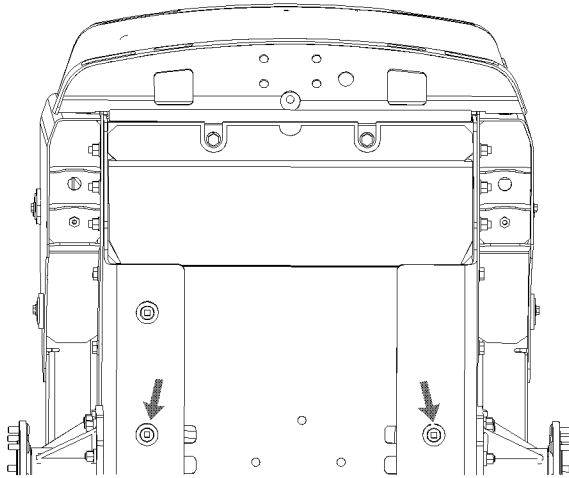


Illustration 151

g01025459

The plugs for the drive chain cases as the plugs are viewed from the underside of the machine.

1. Remove the drain plug for the left drive chain case and the right drive chain case. Allow the oil to drain into a suitable container.
2. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the drain plugs. Install the drain plugs.

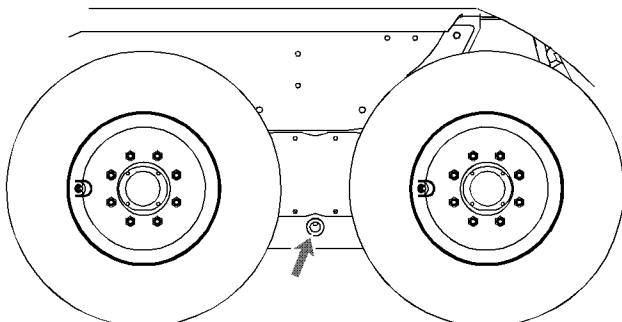


Illustration 152

g01025470

3. Remove the filler plug for the right side drive chain case. Fill the drive chain case with oil to the bottom of the threads on the fill port. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities".

4. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the filler plug. Install the filler plug.
5. Repeat the process for the left side drive chain case.

Drive Chain Case Breathers

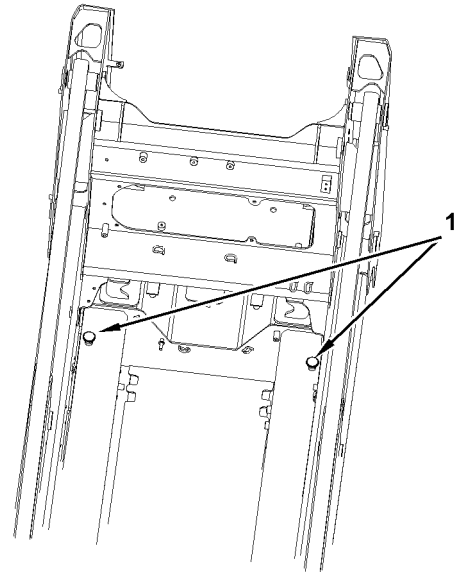


Illustration 153

g01031152

The breathers for the drive chain cases are located underneath the cab (1). Refer to Operation and Maintenance Manual, "Cab Tilting".

Remove the breathers and inspect the breathers when the oil in the drive chain cases is changed. In order to clean the breathers, use solvent and low pressure air. If the breather is badly plugged, replace the breather.

i01977636

Drive Chain Tension - Check/Adjust

SMCS Code: 3261-025; 3261-535

Note: Steel tracks that go over the tires should only be used with pneumatic tires. The use of rubber tracks that go over the tires is not recommended. When you use steel tracks that go over the tires and under severe operating conditions the interval for checking the drive chains should be reduced to Every 100 Service Hours.

Note: There are four drive chains on the skid steer loader that must be checked and adjusted.

1. Park the machine on level ground and stable ground.
2. Chock the rear tires.
3. Use an appropriate floor jack to lift the front of the machine so that the front tires are off of the ground. Block up the front of the machine with two 1U-9758 Jack Stands.

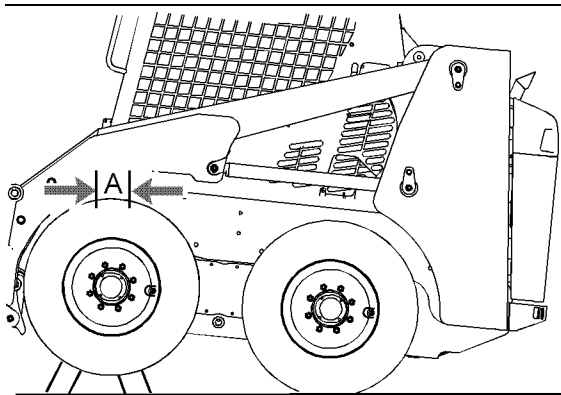


Illustration 154

g01025514

4. Rotate the wheel forward and backward. Measure the total free play (A).

Note: If the total free play does not exceed 15 mm (0.6 inch) the chain tension does not need further inspection. If the total free play exceeds 15 mm (0.6 inch), you should continue with the inspection.

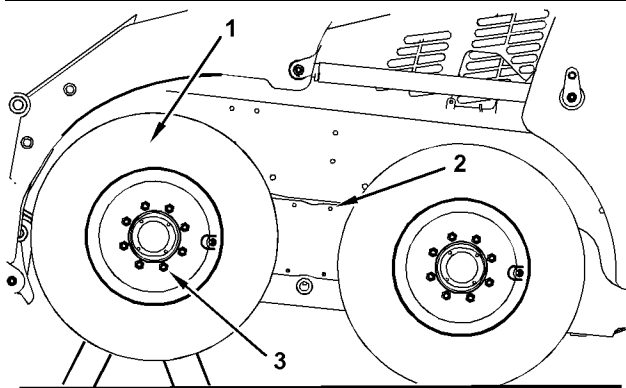


Illustration 155

g01025547

5. Remove the eight wheel nuts (3). Use an appropriate nylon lifting strap and a hoist in order to remove the tire and rim (1). The weight of the standard tire and rim is 51 kg (113 lb).
6. Remove bolts and the cover (2) for the drive chain case.

Note: Remove the sealant from the cover and from the machine.

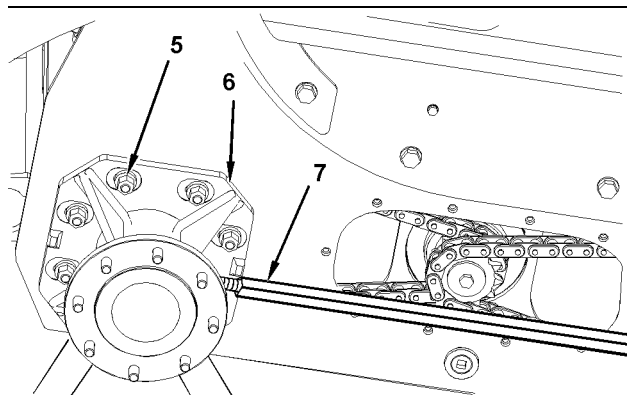


Illustration 156

g01025571

7. Loosen the eight bolts (5) for the axle housing. Place 159-3337 Chain Tension Adjuster (7) between the axle housings (6).

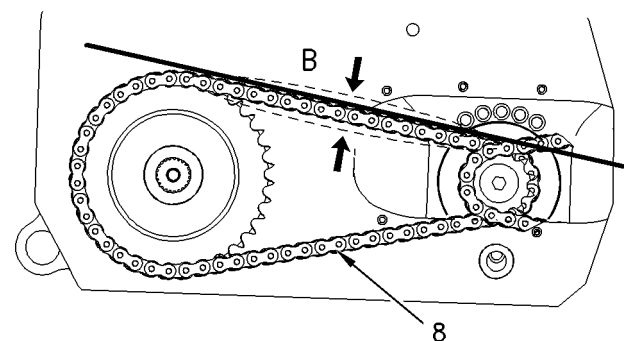


Illustration 157

g00867842

8. Rotate the axle in order to ensure that the chain (8) is taut below the sprockets. Place a straight edge across the top of the sprockets. Measure the total amount of movement in the chain (B). Set the chain tension so that there is a total of 15 mm (0.6 inch) movement in the chain. This is equal to 7.5 mm (0.3 inch) of movement above the straight edge and 7.5 mm (0.3 inch) of movement below the straight edge.

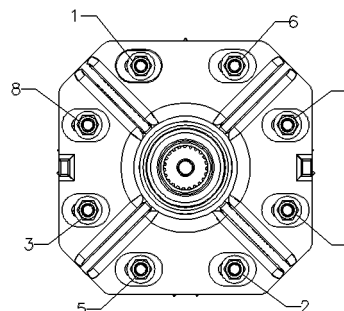


Illustration 158

g00554036

9. Tighten the bolts for the axle housing in the order that is shown above to $50 \pm 15 \text{ N}\cdot\text{m}$ ($37 \pm 11 \text{ lb ft}$). Torque all nuts again to $50 \pm 15 \text{ N}\cdot\text{m}$ ($37 \pm 11 \text{ lb ft}$) and turn an additional $90 \pm 5^\circ$ in the same order.

10. Remove the chain tension adjuster.

11. Install the bolts and the cover for the drive chain case.

Note: Use 8T-9022 Silicone Gasket in order to seal the cover to the machine.

12. Use an appropriate nylon lifting strap and a hoist in order to position the tire and rim to the axle. The weight of the tire and rim is 51 kg (113 lb). Refer to Operation and Maintenance Manual, "Wheel Nuts - Tighten" for the procedure to tighten the wheel nuts.

13. Lower the front of the machine to the ground. Repeat the procedure on the opposite side of the machine if it is necessary.

14. Repeat the adjustment procedure on the rear drive chains if it is necessary.

Service the air cleaner filter elements when the yellow piston on the engine air filter service indicator enters the red zone. Refer to Operation and Maintenance Manual, "Engine Air Filter Service Indicator - Inspect/Replace".

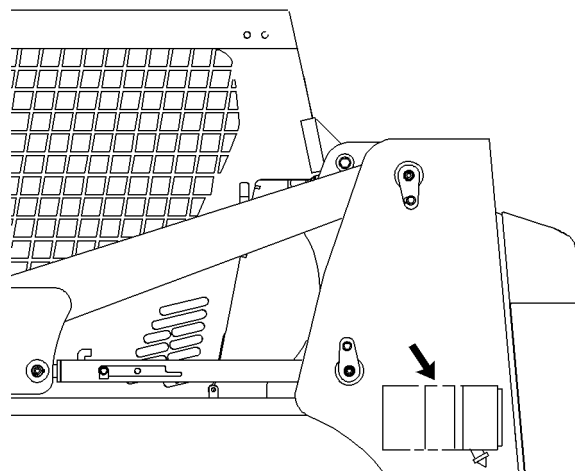


Illustration 159

g00891467

i01741103

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-070-PY; 1054-510-PY

NOTICE

Never service the air cleaner when the engine is running, to avoid engine damage.

NOTICE

Caterpillar recommends certified air filter cleaning services that are available at Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following recommendations if you attempt to clean the filter element:

Never tap or strike the filter element in order to remove dust.

Never wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 206 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid tearing or voiding the pleats.

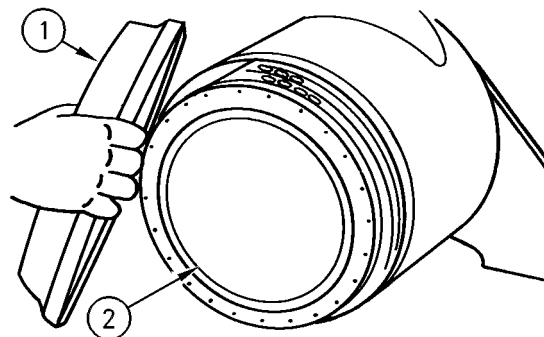


Illustration 160

g00101864

1. Remove the air cleaner housing cover (1).
2. Remove the primary filter element (2).
3. Install a clean filter element and install the cover.
4. Reset the engine air filter service indicator.

i01741365

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

Always replace the secondary filter element. Never attempt to reuse it by cleaning.

The secondary filter element should be replaced at the time the primary element is serviced for the third time.

The secondary filter element should also be replaced if the yellow piston in the filter element indicator enters the red zone after installation of a clean primary element, or if the exhaust smoke is still black.

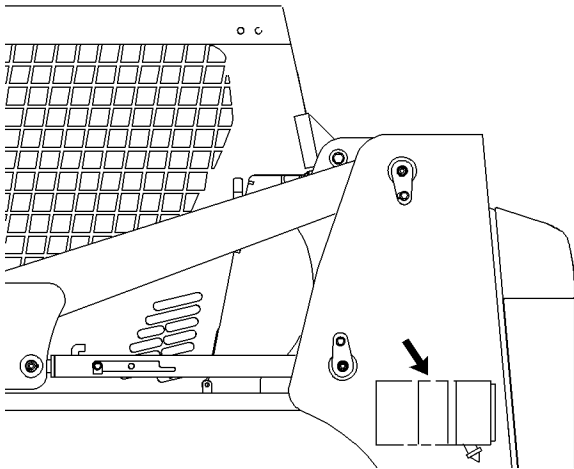


Illustration 161

g00891467

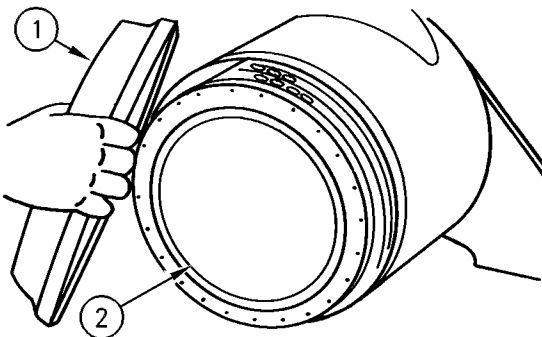


Illustration 162

g00101864

1. Remove the air cleaner housing cover (1).
2. Remove the primary filter element (2).

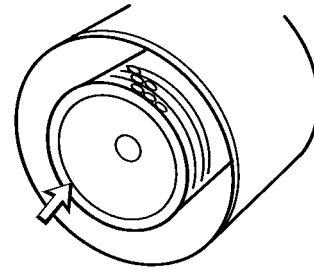


Illustration 163

g00038606

3. Remove the secondary filter element.
4. Cover the air inlet opening. Clean the inside of the air cleaner housing.
5. Inspect the gasket between the air inlet pipe and the air cleaner housing. Replace the gasket if the gasket is damaged.
6. Uncover the air inlet opening. Install a new secondary element.
7. Install the primary element and the air cleaner housing cover.
8. Reset the engine air filter service indicator. Refer to Operation and Maintenance Manual, "Engine Air Filter Service Indicator - Inspect".

i01584621

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040

NOTICE

Service the air cleaner only with the engine stopped. Engine damage could result.

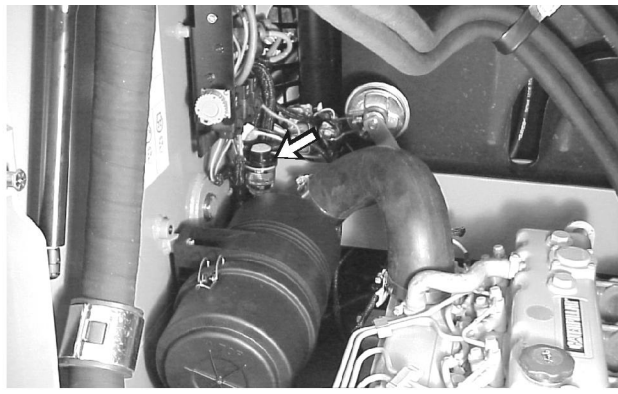


Illustration 164
Type 1

g00581103

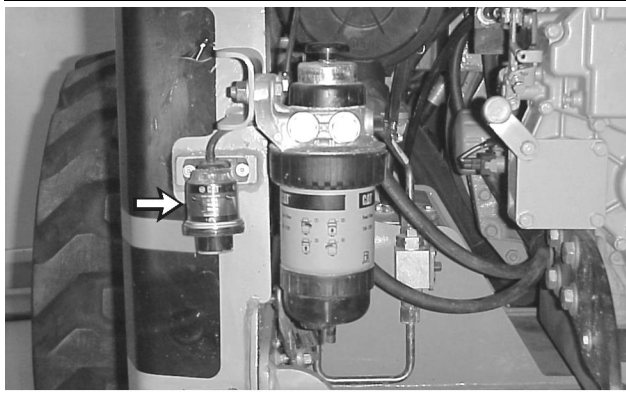


Illustration 165
Type 2

g00822120

1. Mount the machine.
2. Fasten the seat belt. Lower the armrest.
3. Start the engine.
4. Run the engine at high idle.
5. Stop the engine.
6. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
7. Tilt the radiator upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".
8. Inspect the engine air filter service indicator. If the yellow piston in the filter service indicator enters the red zone, service the air cleaner.

Note: See the Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace". See the Operation and Maintenance Manual, "Engine Air Filter Secondary Element - Replace".

9. Reset the engine air filter service indicator.

10. Tilt the radiator downward.

11. Close the engine access door.

i01978979

Engine Compartment - Clean

SMCS Code: 1000-070

Inspect the engine compartment for dirt buildup or debris. Remove any dirt or debris from the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Remove any debris or dirt from the engine compartment.

Note: Use care when you clean the engine compartment. Damage to the machine may occur.

3. Close the engine access door.

Air Conditioning Condenser

The air conditioning condenser is located at the back of the engine compartment. Cleaning the air conditioning condenser will maintain optimum performance of the air conditioning system.

Use low pressure water in order to clean the condenser.

i01819955

i01878882

Engine Crankcase Breather (Closed Circuit) - Replace

SMCS Code: 1317-510

S/N: CED1-Up

S/N: 5SZ1-Up

S/N: 6LZ1-Up

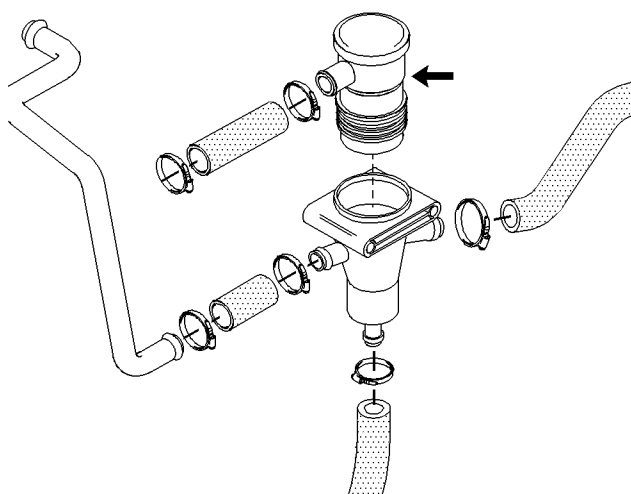


Illustration 166

g00929163

The breather is located on the left side of the engine on turbocharged machines.

NOTICE

Ensure that the breather pipe connections are tight. Do not overfill the engine crankcase. If there is too much oil in the crankcase oil may enter the breather. Oil entering the breather may cause the engine speed to increase rapidly without control.

1. Firmly grasp the breather and pull up on the breather in order to remove the breather.
2. Remove the breather hoses. Clean the hoses with nonflammable solvent.
3. Install a new breather. Ensure that the breather is properly seated in the base.
4. Install the breather hoses. Ensure that the connections are tight.

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

S/N: CAB1-Up

S/N: CMB1-Up

S/N: FDG1-Up

S/N: 4NZ1-Up

S/N: 4YZ1-Up

S/N: 5FZ1-Up

S/N: 5SZ1-Up

S/N: 6BZ1-Up

Note: This type of engine crankcase breather is used on naturally aspirated engines only.

Note: Ensure that the area around the vent hole on the breather cover is clean and that the vent hole is not restricted. Ensure that the breather hose is installed correctly, so that the hose does not contact other parts. Ensure that the components of the breather assembly are seated in the correct positions. Otherwise, engine damage could result.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Tilt the radiator upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".

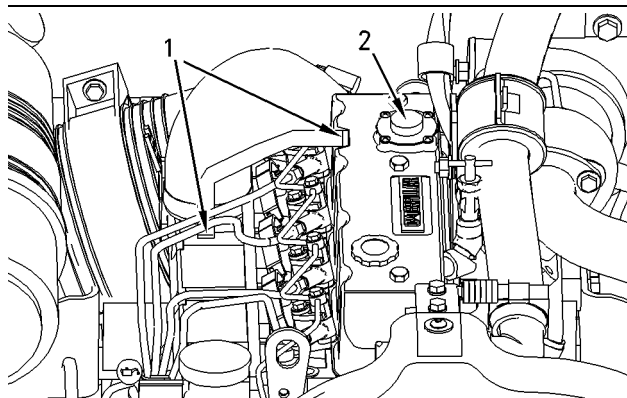


Illustration 167

g00956198

Breather location (2)

i01589332

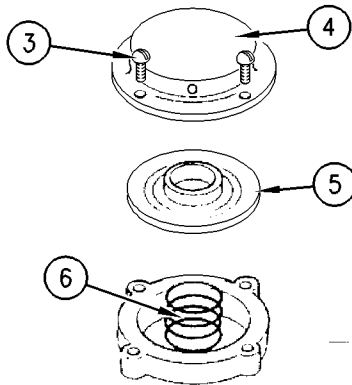


Illustration 168

g00822156

3. Loosen the hose clamps (1) for the breather hose. Remove the breather hose.
4. Remove the screws (3). Remove the breather cover (4).
5. Remove the diaphragm assembly (5). The diaphragm assembly consists of the diaphragm and the locating ring. Remove the spring (6).
6. Clean the following items with a clean, nonflammable solvent:
 - Breather
 - Breather cover
 - Diaphragm assembly
 - Location ring assembly
 - Spring
 - Breather hose
7. Allow the parts to dry. Pressure air may be used to dry the parts.
8. Inspect the breather hose for damage. Replace the breather hose, if necessary.
9. Install the elements of the breather. Install the breather element cover assembly.
10. Install the breather hose and tighten the hose clamps for the breather hose.
11. Tilt the radiator downward.
12. Close the engine access door.

Engine Oil Level - Check

SMCS Code: 1348-535-FLV

NOTICE

Do not overfill the crankcase. Engine damage can result.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Tilt the radiator upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".

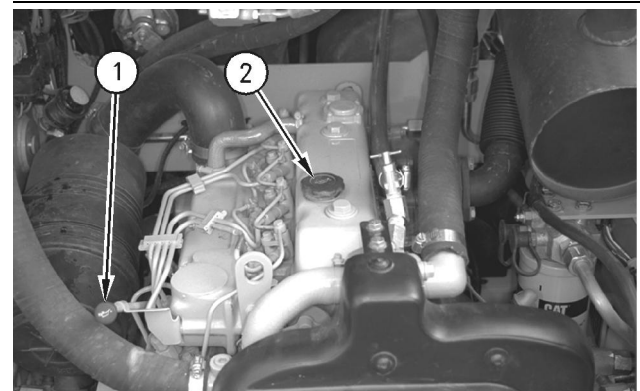


Illustration 169

g00753070

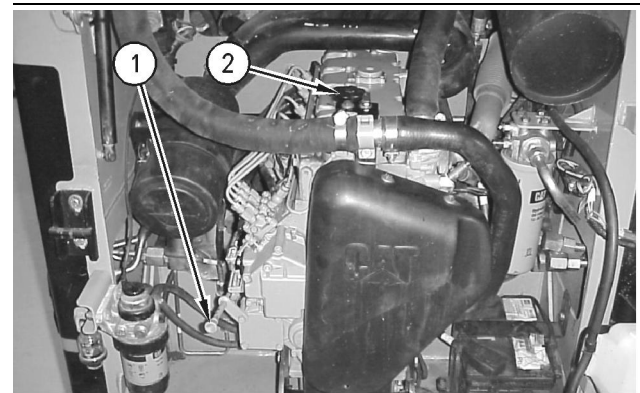


Illustration 170

g00822225

3. While the engine is stopped, maintain the oil level between the "ADD" mark and the "FULL" mark on the engine oil dipstick (1).
4. If necessary, remove the oil filler cap (2) and add oil.
5. Clean the oil filler cap and install the oil filler cap.
6. Tilt the radiator downward.
7. Close the engine access door.

i01959048

Engine Oil Sample - Obtain

SMCS Code: 1348-554-SM; 7542-008

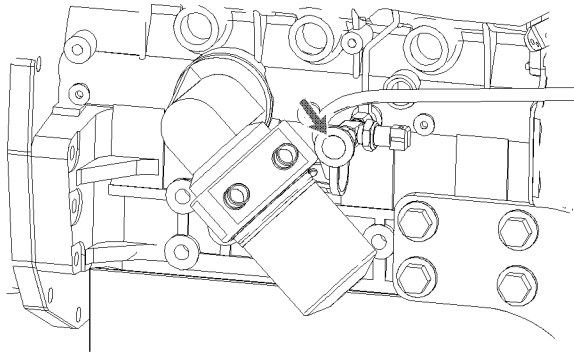


Illustration 171
3024 engine

g01018202

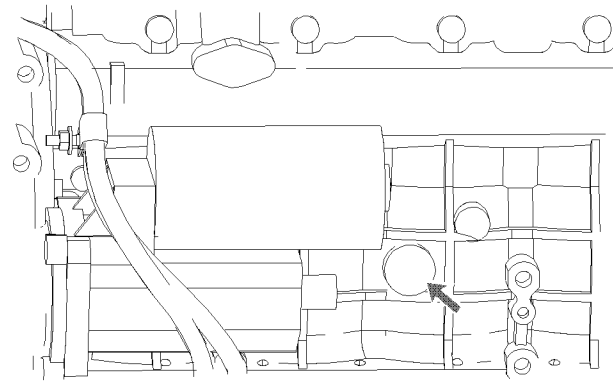


Illustration 172
3044 engine

g01018203

The sampling port for the engine oil is located on the left side of the engine block.

i01584706

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1348-044

The normal oil change interval for the Skid Steer loader is Every 500 Service Hours or every year when the following conditions are met:

- Caterpillar oil or API Specification CG-4 multigrade oil is used.
- Caterpillar filters are used.
- The altitude does not exceed 2300 m (7545 ft).

- Sulfur content in the fuel is between 0.05% and 0.50%.

An oil change interval of Every 250 Service Hours or every month is required when the following conditions occur:

- Caterpillar oil or API Specification CG-4 multigrade oil is not used.
- The altitude exceeds 2300 m (7545 ft).
- Sulfur content in the fuel is between 0.50% and 1.00%.

An oil change interval of Every 125 Service Hours is required when the following condition occurs:

- Sulfur content in the fuel is above 1.00%.

Refer to the results of the S·O·S oil analysis in order to determine if the oil change interval should be decreased. Consult your Caterpillar Dealer for detailed information regarding the optimum oil change interval.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Tilt the radiator upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".



Illustration 173
Type 1

g00822183

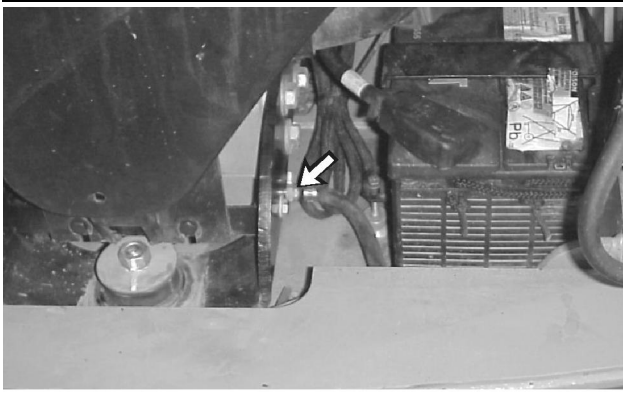


Illustration 174

g00822206

Type 2

Note: The crankcase drain is located on the left side or right side of the oil pan.

3. Pull the drain hose for the crankcase through the opening in the rear of the machine and remove the plug in the end of the drain hose.
4. Open the crankcase drain valve and drain the oil into a suitable container. Close the crankcase drain valve. Install the plug in the drain hose.

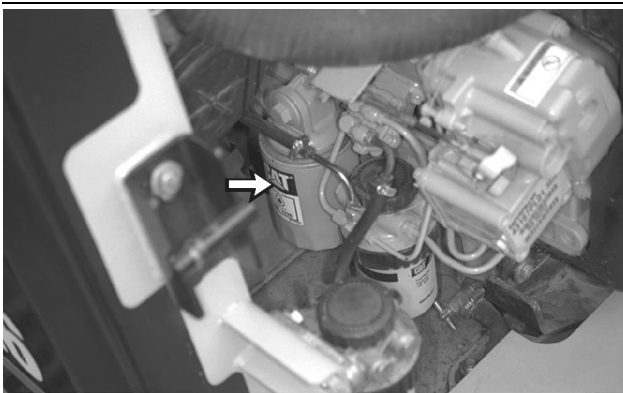


Illustration 175

g00529255

Type 1

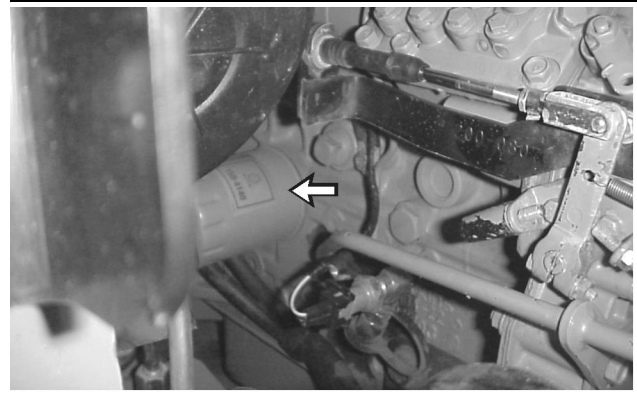


Illustration 176

g00822189

Type 2

5. Remove the filter element with a strap type wrench. Refer to Operation and Maintenance Manual, "Oil Filter - Inspect".
6. Apply a thin film of clean engine oil to the sealing surface of the new filter element.
7. Install the new filter element by hand. When the gasket contacts the filter base, tighten the filter for an additional 3/4 turn.

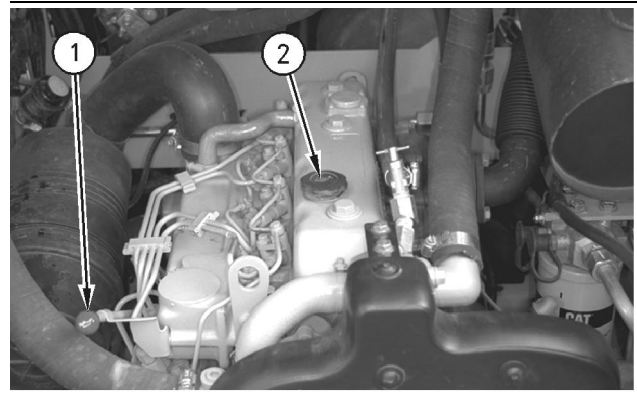


Illustration 177

g00753155

Type 1

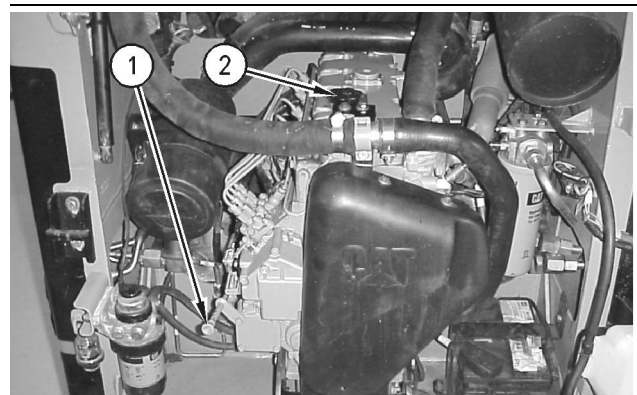


Illustration 178

g00822225

Type 2

8. Remove the oil filler plug (2). Fill the crankcase with new oil. See Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities". Clean the oil filler plug and install the oil filler plug.
9. Start the engine and allow the oil to warm. Check for leaks.
10. Stop the engine and allow the oil to drain back into the oil pan. Maintain the oil level in the crosshatched region of the engine oil dipstick (1). Add oil, if necessary.
11. Tilt the radiator downward.
12. Close the engine access door.

i01752164

Engine Starting with Jump Start Cables

SMCS Code: 1000; 7000

WARNING

Batteries give off flammable fumes that can explode resulting in personal injury.

Prevent sparks near the batteries. They could cause vapors to explode. Do not allow the jump start cable ends to contact each other or the machine.

Do not smoke when checking battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

Always wear eye protection when starting a machine with jump start cables.

Improper jump start procedures can cause an explosion resulting in personal injury.

Always connect the positive (+) to positive (+) and the negative (-) to negative (-).

Jump start only with an energy source with the same voltage as the stalled machine.

Turn off all lights and accessories on the stalled machine. Otherwise, they will operate when the energy source is connected.

NOTICE

To prevent damage to engine bearings and to electrical circuits when you jump start a machine, do not allow the stalled machine to touch the machine that is used as the electrical source.

Severely discharged maintenance free batteries do not fully recharge from the alternator after jump starting. The batteries must be charged to proper voltage with a battery charger. Many batteries thought to be unusable are still rechargeable.

Use only equal voltage for starting. Check the battery and starter voltage rating of your machine. Use only the same voltage for jump starting. Use of a welder or higher voltage damages the electrical system. This machine has a 12 volt starting system. Use only the same voltage for jump starting.

Refer to Special Instruction, SEHS7633, "Battery Test Procedure" available from your Caterpillar dealer, for complete testing and charging information.

1. Determine the reason that the engine will not crank. The Caterpillar Electronic Technician (ET) can be used to aid in troubleshooting if the machine is equipped with the auxiliary hydraulic control module.
2. Engage the parking brake. Lower the work tools to the ground. Refer to Operation and Maintenance Manual, "Equipment Lowering with Engine Stopped". Move all control levers to the HOLD or NEUTRAL position.
3. Turn the engine start switch to the OFF position and turn all accessory switches to the OFF position.
4. Move the machine that is being used as an electrical source near the stalled machine so that the jump start cables reach the stalled machine.
Do not allow the machines to contact each other.
5. Stop the engine of the machine that is being used as an electrical source. If you are using an auxiliary power source, turn off the charging system.
6. Ensure that battery caps on both machines are tight and correctly placed. Ensure that batteries in the stalled machine are not frozen.
7. Connect the positive jump start cable to the positive cable terminal of the discharged battery.

Do not allow the positive cable clamps to contact any metal except for the battery terminals.

8. Connect the other positive end of the jump start cable to the positive cable terminal of the electrical source.
9. Connect one negative end of the jump start cable to the negative cable terminal of the electrical source.
10. Connect the other negative end of the jump start cable to the engine block or to the frame of the stalled machine. **Do not connect the jump start cable to the battery post. Do not allow the jump start cables to contact the battery cables, the fuel lines, the hydraulic lines, or any moving parts.**
11. Start the engine of the machine that is being used as an electrical source or energize the charging system on the auxiliary power source.
12. Wait at least two minutes before you attempt to start the stalled machine. This will allow the battery in the stalled machine to partially charge.
13. Attempt to start the stalled engine. See Operation and Maintenance Manual, "Starting the Engine" for the correct starting procedure.
14. After the stalled engine starts, disconnect the negative jump start cable from the stalled machine.
15. Disconnect the negative jump start cable from the negative terminal of the electrical source.
16. Disconnect the positive jump start cable from the positive terminal of the electrical source.
17. Disconnect the positive jump start cable from the positive terminal of the stalled machine.
18. Conclude the failure analysis on the starting system of the stalled machine and/or on the charging system of the stalled machine. Check the machine while the engine is running and the charging system is in operation.

i01020861

Engine Valve Lash - Check

SMCS Code: 1105-025

Refer to the Service Manual for the complete adjustment procedure for the engine valve lash.

A qualified mechanic should adjust the engine valve lash and the fuel injector timing because special tools and training are required.

i00916186

Fuel Injection Timing - Check

SMCS Code: 1251-531

Note: The correct fuel timing specification is found on the Engine Information Plate. Fuel timing specifications may vary for different engine applications and/or for different power ratings.

A qualified mechanic should adjust the fuel injection timing because special tools and training are required.

Refer to the Service Manual for the complete adjustment procedure for the fuel injection timing. Refer to your Caterpillar dealer for the complete adjustment procedure for the fuel injection timing.

i01584831

Fuel System Filter - Replace

SMCS Code: 1261-510

NOTICE

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

The fuel filter is located in the engine compartment on the left side of the machine.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

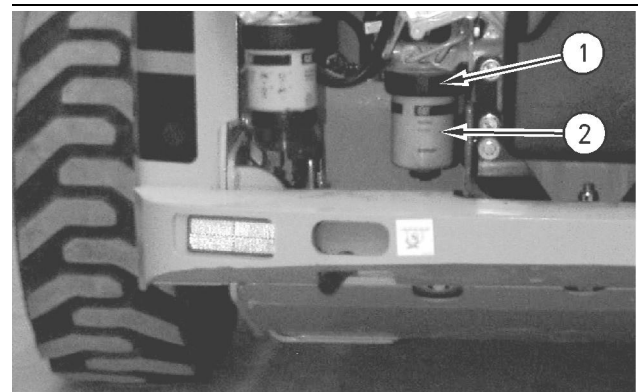


Illustration 179

Fuel Filter (Type 1)

g00753192

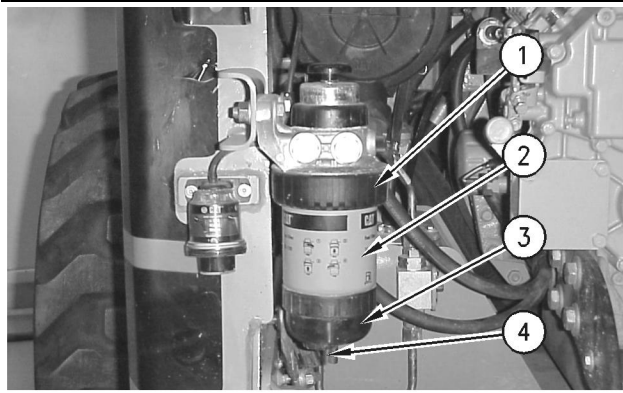


Illustration 180

g00822253

Fuel Filter/Water Separator (Type 2)

2. On type 2 systems, start by opening the drain valve (4). Allow the water and fuel to drain into a suitable container. Close the drain valve.
3. Support the filter element (2) and rotate the locking ring (1) counterclockwise. Remove the locking ring.
4. Remove the filter element. On type 2 systems, remove the water separator bowl (3) from the filter element. Inspect the fuel filter for debris by cutting the filter open. Discard the filter properly.
5. Clean the mounting base of the fuel filter. Remove any part of the old seal that remains on the mounting base of the fuel filter.
6. Coat the seal of the new fuel filter with clean diesel fuel.
7. Install the new fuel filter by hand. Rotate the locking ring clockwise. When the seal contacts the base, tighten the locking ring for an additional three quarters of a turn. On type 2 systems, reinstall the water separator bowl.
8. Prime the fuel system. Refer to Operation and Maintenance Manual, "Fuel System Priming Pump - Operate".
9. Close the engine access door.

i02095894

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

The fuel system water separator is located in the engine compartment at the rear of the machine.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

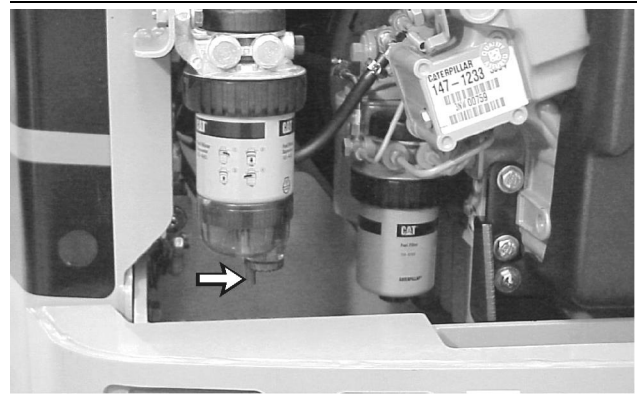


Illustration 181

g00582050

2. Loosen the drain valve on the bottom of the water separator. Allow the water and the sediment to drain into a suitable container.
3. Tighten the drain valve.
4. Close the engine access door.

i02095904

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1260-510-FQ; 1263-510-FQ

The water separator element for the fuel system is located in the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

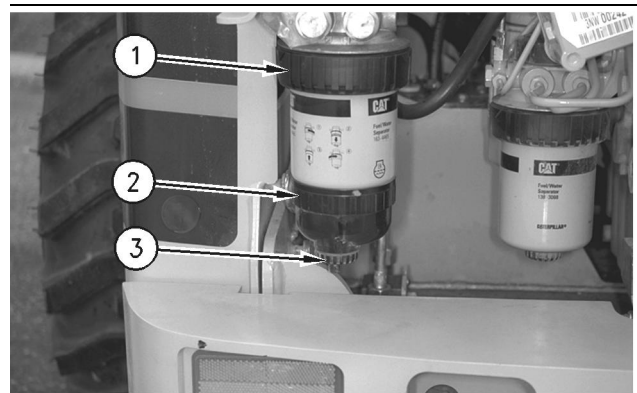


Illustration 182

g00753251

2. Open the drain on the water separator bowl (3). Allow the water and fuel to drain into a suitable container.
3. Support the water separator element and rotate the locking ring (1) counterclockwise. Remove the water separator.
4. Remove the water separator bowl (2) from the bottom of the water separator element.

Note: The water separator bowl is reusable. Do not discard the water separator bowl.

5. Inspect the O-ring seal of the water separator bowl for damage. Replace the O-ring seal, if necessary.
6. Lubricate the O-ring seal with clean diesel fuel or lubricate the O-ring seal with motor oil. Place the seal in the water separator bowl.
7. Spin the water separator bowl onto the new element by hand until the water separator is snug. Do not use tools to tighten the water separator element to the bowl.
8. Clean the filter mounting base.
9. Install the new element. Rotate the locking ring clockwise in order to fasten the filter to the mounting base.
10. Prime the fuel system in order to fill the fuel filter/water separator element with fuel. Refer to Operation and Maintenance Manual, "Fuel System Priming Pump - Operate".
11. Close the engine access door.

i01585017

Fuel System Priming Pump - Operate

SMCS Code: 1258-548

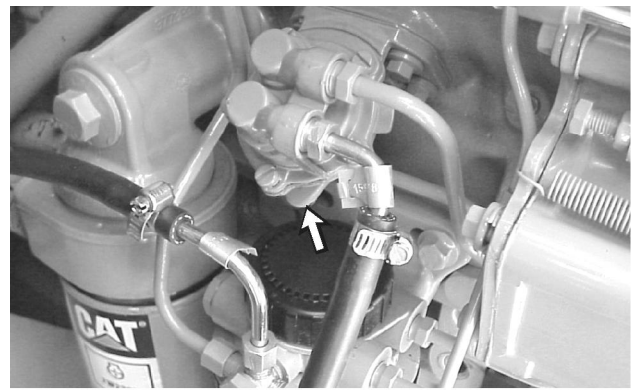


Illustration 183

g00585689

Fuel Priming Pump (Type 1)

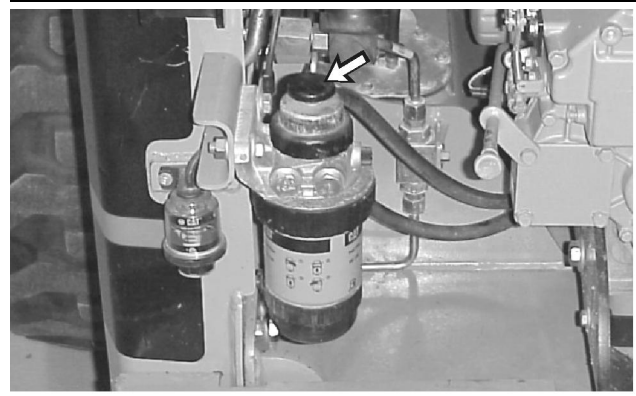


Illustration 184

g00822388

Fuel Priming Pump (Type 2)

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

Note: On type 1 systems, when the cam for the fuel pump is in the maximum lift position, the priming lever will not function. In this situation, the crankshaft must be turned one revolution.

2. Push down on the top of the fuel priming pump plunger and release the fuel priming pump plunger in order to operate the fuel priming pump. Operate the fuel priming pump plunger in order to fill the new filter element with fuel. Continue to pump until increased resistance is felt. This resistance will indicate that the filter element is full of fuel.

3. Start the engine. If the engine does not start, further priming is necessary. If the engine starts but the engine continues to misfire, further priming is necessary. If the engine starts but the engine continues to emit smoke, further priming is necessary.
4. If the engine starts but the engine runs rough, continue to run the engine at low idle. Continue to run the engine at low idle until the engine runs smoothly.
5. Close the engine access door.

i01014038

Fuel Tank Cap - Clean

SMCS Code: 1273-070-Z2

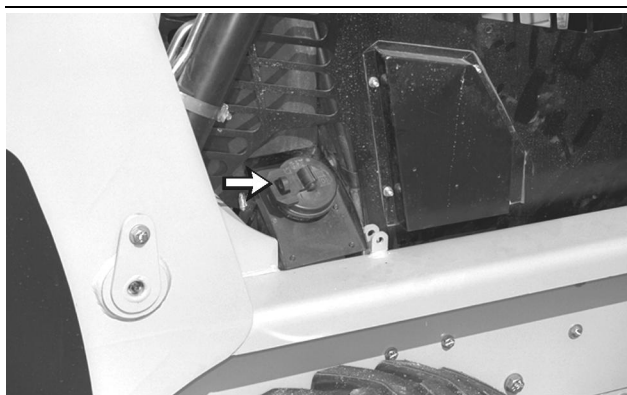


Illustration 185

g00522993

1. Remove the fuel cap.

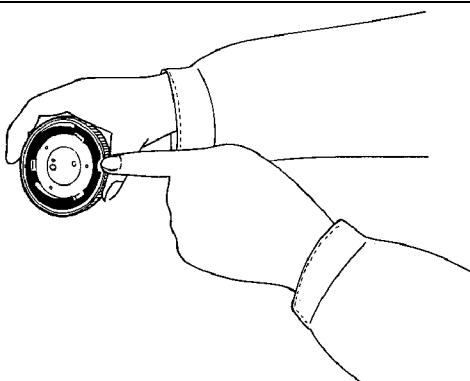


Illustration 186

g00104238

2. Inspect the cap. Replace the cap if the cap is damaged.
3. Wash the fuel cap in a clean, nonflammable solvent and dry the fuel cap.
4. Put a light coating of fuel on the cap gasket.

5. Install the fuel cap.

i01451176

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

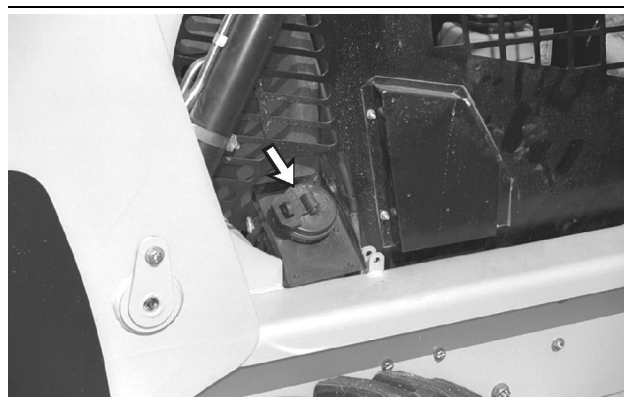


Illustration 187

g00531159

1. Slowly remove the fuel tank cap in order to relieve tank pressure.

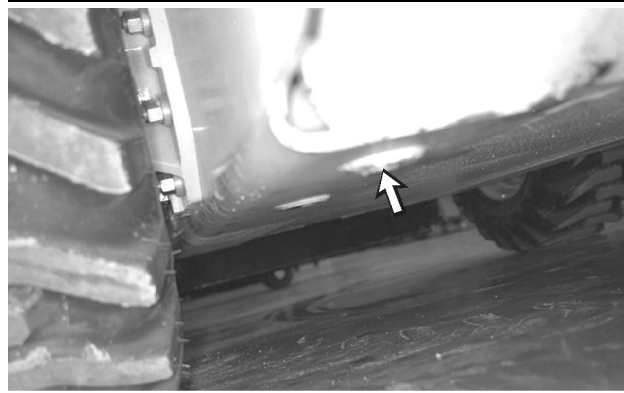


Illustration 188

g00531160

2. The fuel tank drain is located on the left side of the machine on the bottom of the machine. Remove the fuel tank drain plug.
3. Allow the water and sediment to drain into a suitable container.
4. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the drain plug. Install the fuel tank drain plug.
5. Install the fuel tank cap.

Note: Drain the water and sediment from the fuel tank when the tank is almost empty. Removal of the plug will cause all of the contents of the tank to drain out of the tank.

i01957445

Hydraulic Oil Sample - Obtain

SMCS Code: 5050-008; 7542-008

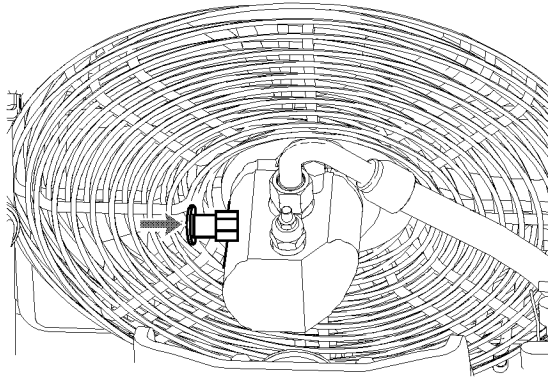


Illustration 189

g01026057

The sampling port for the hydraulic oil is located on the fan motor.

i01585035

Hydraulic System Oil - Change

SMCS Code: 5095-044

Operate the machine for a few minutes in order to warm the hydraulic system oil.

WARNING

Personal injury or death can result without releasing all of the hydraulic pressure.

Release all the pressure from the hydraulic system before any lines are disconnected.

The machine should be level. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine. Keep the armrest lowered. Turn the engine start switch key to the ON position. Push the parking brake switch. Move all of the hydraulic control levers while you press several times on each side of the auxiliary hydraulic control (if equipped) in order to relieve hydraulic pressure. Move the engine start switch key to the OFF position.

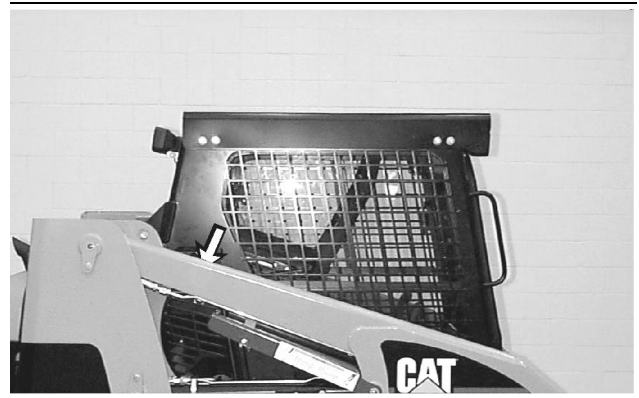


Illustration 190

g00533263

The hydraulic tank filler cap is located on the right side of the machine above the fuel filler cap.

1. Remove the hydraulic tank filler cap.
2. Place supports under the rear of the machine in order to support the machine while the cab is in the raised position.

Note: The hydraulic oil drain is located under the cab.

Note: Empty the water tank (if equipped) before you raise the cab.

3. Tilt the cab upward. Refer to Operation and Maintenance Manual, "Cab Tilting".

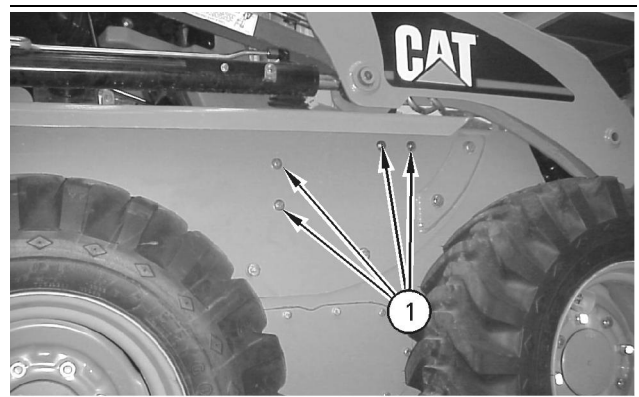


Illustration 191

g00669784

4. If the machine is a 228 or 248 Skid Steer Loader, then you may need to remove the four bolts (1) that hold the control assembly. You may need to remove the control assembly in order to reach the drain hose and the drain valve.

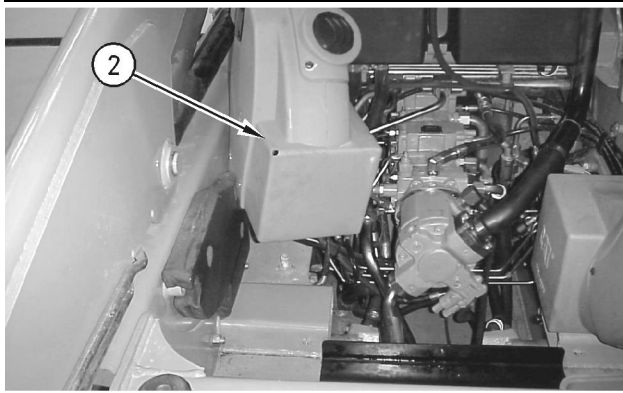


Illustration 192

g00669799

5. Move the control console (2) toward the hydraulic tank. This will help you to be able to reach the hydraulic drain hose and the hydraulic drain valve on the 228 or 248 Skid Steer Loader.

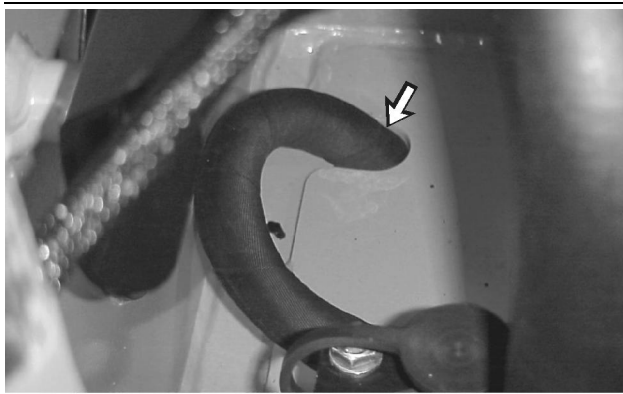


Illustration 193

g00582823

The drain hose is located in the rear right rear corner of the lower frame in the hydraulic motor compartment.

6. Remove the plug from the end of the drain hose. Put the drain hose through the hole in the lower frame.

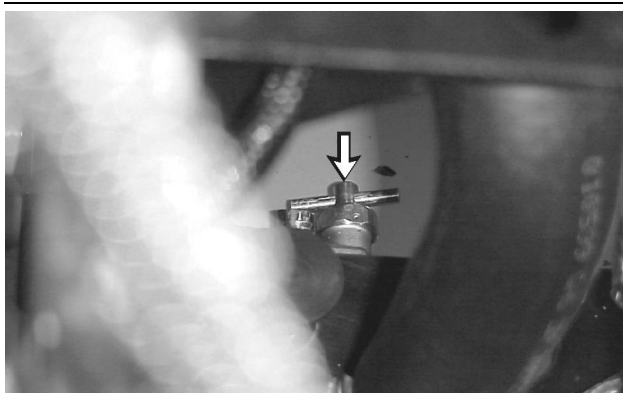


Illustration 194

g00582832

The drain valve is located on the side of the return manifold.

7. Open the drain valve and drain the oil into a suitable container.
 8. Close the drain valve and pull the drain hose back into the machine. Install the drain plug into the drain hose.
 9. Tilt the cab downward and install the bolts for the ROPS. Torque the bolts to 125 ± 40 N·m (92 ± 30 lb ft).
 10. Remove the supports from the rear of the machine.
 11. Change the hydraulic system filter. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Change".
 12. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities".
 13. Maintain the hydraulic oil level approximately in the middle of the sight gauge.

Check the oil level with the loader arms in the fully lowered position.
- Note:** The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps.
14. Install the hydraulic tank filler cap.

i01712710

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

The hydraulic oil filter is located in the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".



Illustration 195

g00533263

2. Remove the hydraulic tank filler cap.

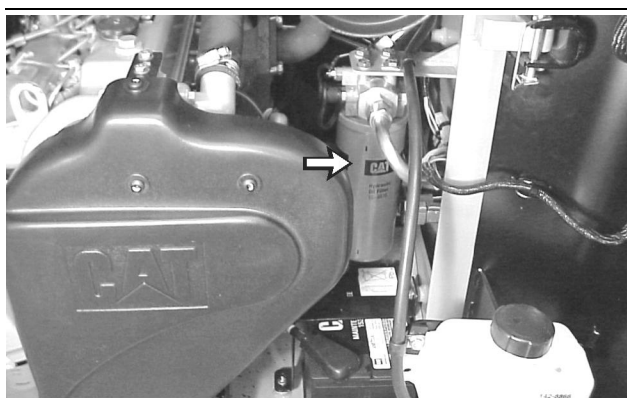


Illustration 196

g00582847

3. The hydraulic oil filter is located on the right side of the engine compartment.

Note: Place a suitable nonconductive container under the hydraulic oil filter. Use this container in order to catch any oil that may spill from the filter or the filter element mounting base.

4. Remove the filter with a strap type wrench.
5. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.
6. Apply a light coat of oil to the gasket of the new filter element gasket.
7. Install the new filter element by hand. When the gasket contacts the filter element mounting base, tighten the filter element for an additional three quarters of a turn.

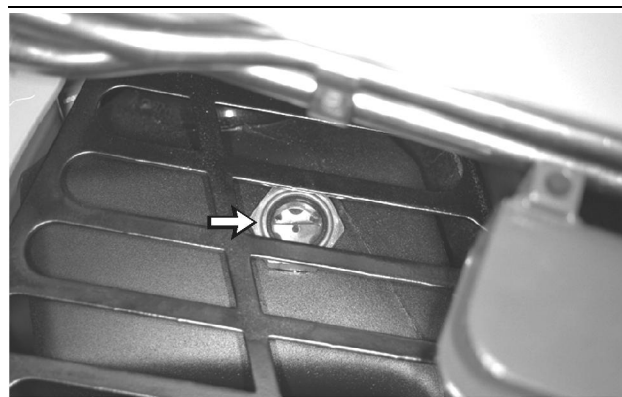


Illustration 197

g00541565

sight gauge (type 1)

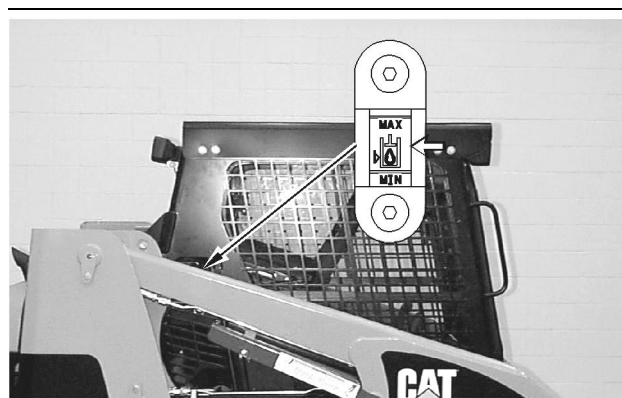


Illustration 198

g00873188

sight gauge (type 2)

8. The sight gauge for the hydraulic oil is located below the hydraulic tank filler cap. Maintain the hydraulic oil level to the middle of the sight gauge. **Do not overfill the hydraulic tank.**
9. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the hydraulic tank filler cap, if necessary. Install the hydraulic tank filler cap.
10. Close the engine access door.

i01786416

Hydraulic System Oil Level - Check

SMCS Code: 5095-535-FLV

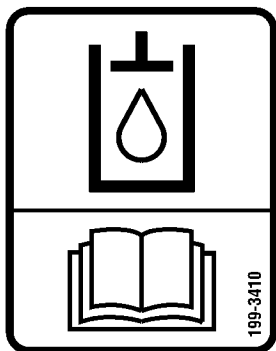


Illustration 199

g00956818

Note: This film is located near the hydraulic filler cap on machines that are filled with synthetic oil.

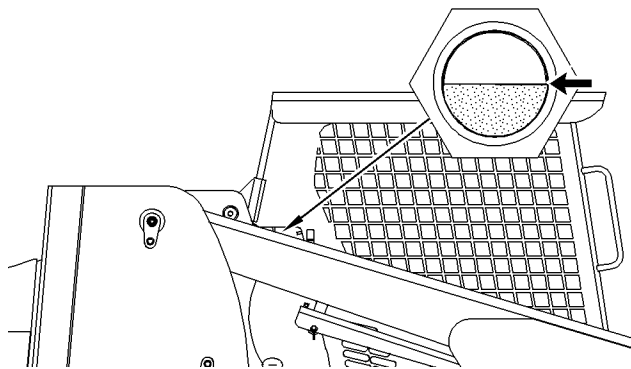


Illustration 200
sight gauge (type 1)

g00926168

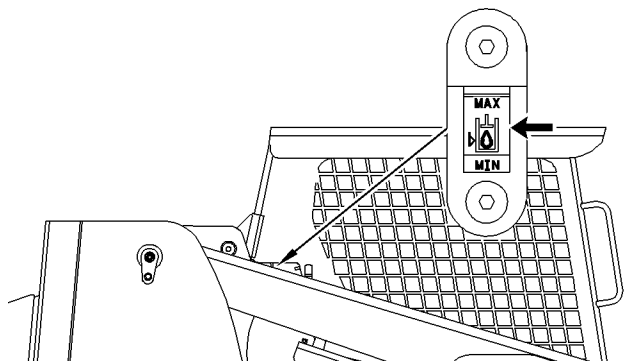


Illustration 201
sight gauge (type 2)

g00926177

1. Park the machine on level ground.

2. Lower the work tool to the ground. Turn off the engine.
3. Wait for about five minutes before checking the level of the hydraulic oil.
4. Maintain the oil level to the middle of the sight gauge. **Do not overfill the hydraulic tank.**

i01713746

Lift Arm and Cylinder Linkage - Lubricate

SMCS Code: 5102-086-BD; 6107-086-BD

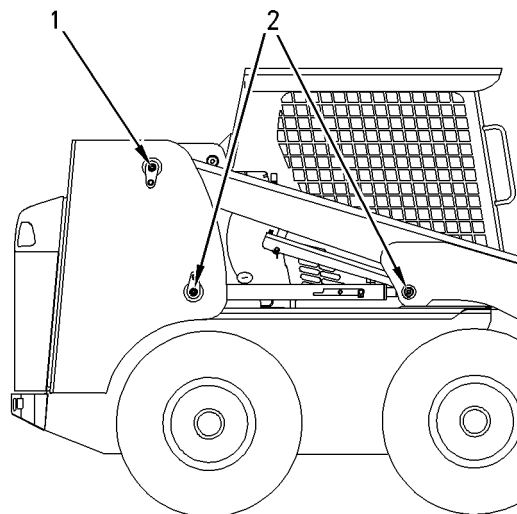


Illustration 202

g00881888

216, 226, 236, 246 and 248 machines

i01963869

Lower Machine Frame - Clean

SMCS Code: 7050-070

1. Tilt the cab upward. Refer to Operation and Maintenance Manual, "Cab Tilting".

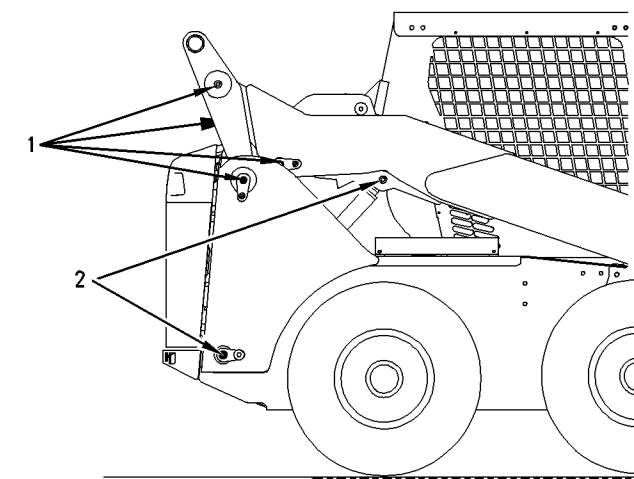


Illustration 203

g00882013

232 and 242 machines

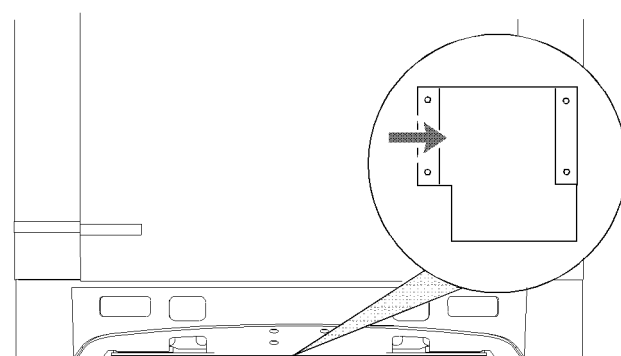


Illustration 205

g01020241

2. Remove the access panel in the frame that is located underneath the machine.
3. Remove any debris or dirt from the inside of the frame.
4. Reinstall the access panel and tilt the cab downward.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 3067-507; 5068-507

Inspect a Used Filter for Debris

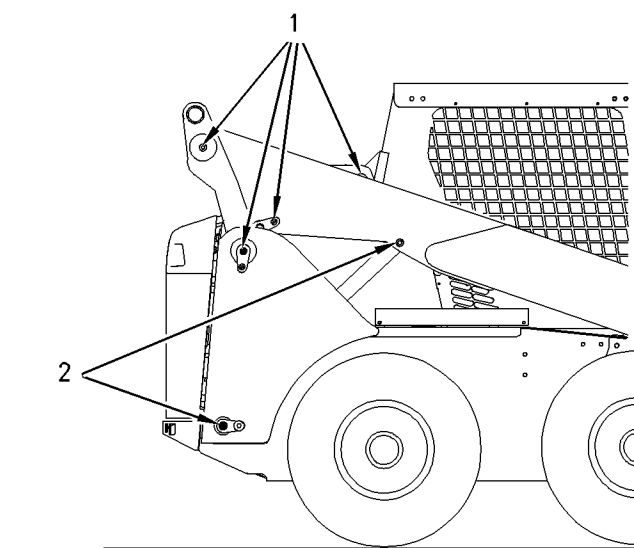


Illustration 204

g00882042

252 and 262 machines

Apply lubricant to the grease fittings (1) for the lift arm linkage.

Apply lubricant to the grease fittings (2) for the lift cylinder bearings.

Repeat the process for the opposite side of the machine.

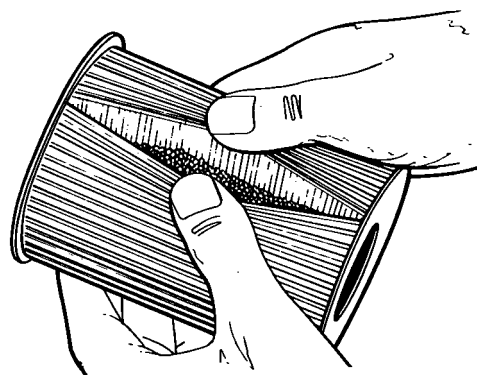


Illustration 206

g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i01227341

Quick Coupler - Inspect

SMCS Code: 6129-040

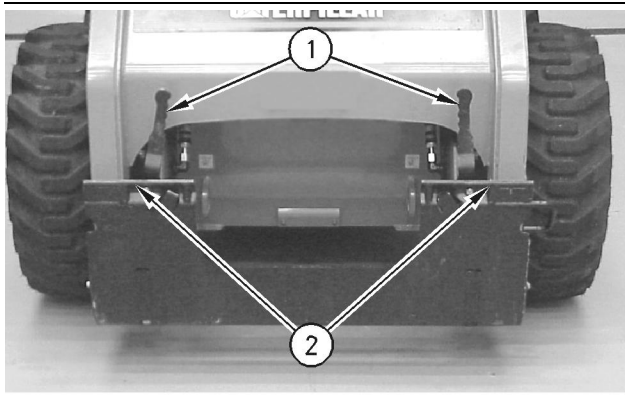


Illustration 207

g00656007

1. Move the quick coupler levers (1) to the disengaged position. Ensure that the levers are not bent or broken.
2. Check the top edges of the quick coupler assembly (2) for wear or for damage.

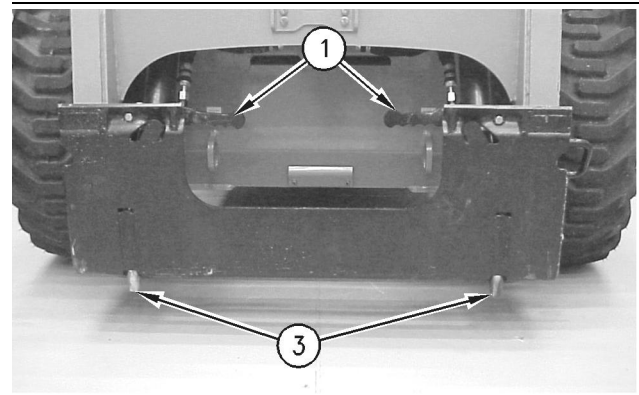


Illustration 208

g00656021

3. Move the quick coupler levers (1) to the engaged position. Ensure that the levers move freely without restriction.
4. Make sure that the coupler pins (3) extend through the bottom of the quick coupler assembly. Check the pins for wear and check the pins for damage.
5. Move the quick coupler levers to the disengaged position.

If any wear is suspected or damage is suspected, consult your Caterpillar dealer before you use a work tool.

i01488851

Radiator Core - Clean

SMCS Code: 1353-070-KO

The radiator is located at the rear of the machine above the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Tilt the radiator guard upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".

NOTICE

When you are using compressed air or high pressure water to clean the radiator fins, ensure that the air or water is directed parallel to the fins. If the compressed air or high pressure water is not directed parallel to the radiator fins, the radiator fins could be bent or damaged.

Note: You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator fins. However, the use of compressed air is preferred.

3. Clean the radiator core.

NOTICE

Do not clean a running fan with high pressure water. Fan blade failure can result.

4. Remove any dirt or debris from the fan, the fan hub, the oil cooler, the radiator guard and the fan guard.

Note: Dirt or debris on the cooling fan can cause an imbalance.

5. Tilt the radiator guard downward.

6. Close the engine access door.

i01968724

Refrigerant Dryer - Replace (If Equipped)

SMCS Code: 7322-510

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

If the refrigerant system has been open to the outside air (without being plugged) for more than 30 minutes, the receiver-dryer must be replaced. Moisture will enter an open refrigerant system and cause corrosion which will lead to component failure.

Refer to Service Manual, SENR5664, "Air Conditioning and Heating R-134a For All Caterpillar Machines" for the proper procedure to change the receiver-dryer assembly and for the procedure to reclaim the refrigerant gas.

Note: The receiver-dryer must also be replaced when the air conditioning system is evacuated.

i01724179

Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) - Inspect

SMCS Code: 7323-040; 7325-040

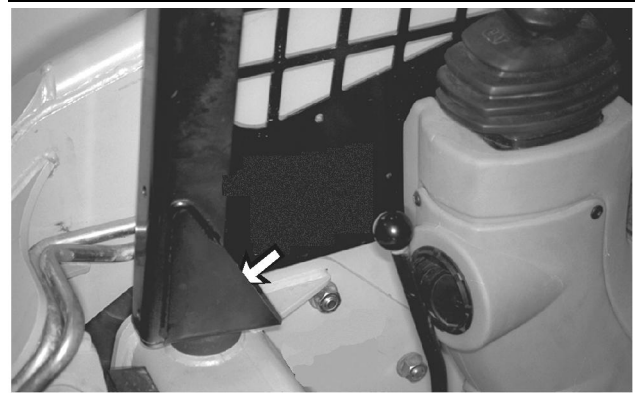


Illustration 209

g00533511

Front ROPS Retaining Bolt (One bolt per side)



Illustration 210

g00583281

Rear ROPS Retaining Bolt (One bolt per side)

i02429589



Illustration 211

g00583274

Retaining bolts for the FOPS 2

1. Inspect the ROPS and the FOPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only.
2. Operate the machine on a rough surface. Replace the ROPS mounting supports if the ROPS emits a noise. Replace the ROPS mounting supports if the ROPS rattles.

Do not straighten the ROPS or the FOPS. Do not repair the ROPS or the FOPS by welding reinforcement plates to the ROPS or the FOPS.

Consult your Caterpillar dealer for repair of any cracks in the ROPS or the FOPS.



Illustration 212

g00583242

Inspect the Flying Objects Guard Structure (if equipped) for any damage to the structure or any damage to the window.

Consult your Caterpillar dealer for repair of any cracks in the Flying Objects Guard Structure.

Refer to Operation and Maintenance Manual, "Cab Tilting" for additional information.

Seat Belt - Inspect

SMCS Code: 7327-040

Always check the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

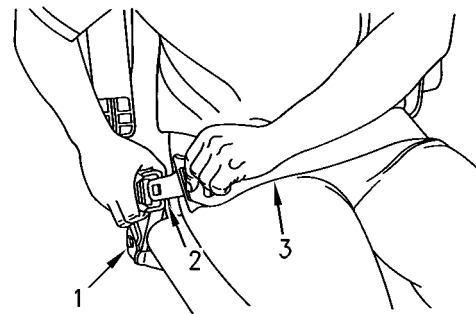


Illustration 213

g00932801

Typical example

Check the seat belt mounting hardware (1) for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

Check buckle (2) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect the seat belt (3) for webbing that is worn or frayed. Replace the seat belt if the seat belt is worn or frayed.

Consult your Caterpillar dealer for the replacement of the seat belt and the mounting hardware.

Note: Within three years of the date of installation or within five years of the date of manufacture, replace the seat belt. Replace the seat belt at the date which occurs first. A date label for determining the age of the seat belt is attached to the seat belt, the seat belt buckle, and the seat belt retractor.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

i02429594

Seat Belt - Replace

SMCS Code: 7327-510

Within three years of the date of installation or within five years of the date of manufacture, replace the seat belt. Replace the seat belt at the date which occurs first. A date label for determining the age of the seat belt is attached to the seat belt, the seat belt buckle, and the seat belt retractor.

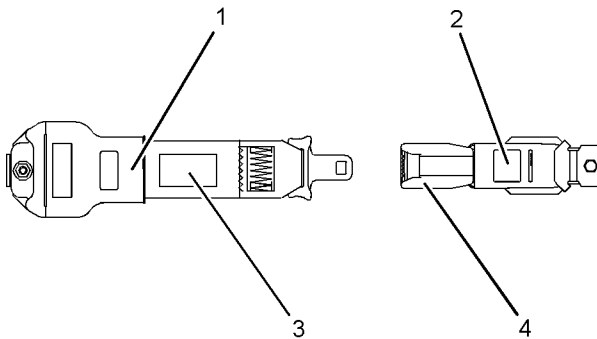


Illustration 214

g01152685

- (1) Date of installation (retractor)
- (2) Date of installation (buckle)
- (3) Date of manufacture (tag) (fully extended web)
- (4) Date of manufacture (underside) (buckle)

Consult your Caterpillar dealer for the replacement of the seat belt and the mounting hardware.

If your machine is equipped with a seat belt extension, also perform this replacement procedure for the seat belt extension.

i01878236

Tilt Cylinder Bearings and Bucket Linkage Bearings - Lubricate

SMCS Code: 5104-086-BD; 6107-086-BD

Wipe all of the grease fittings before you apply lubricant.

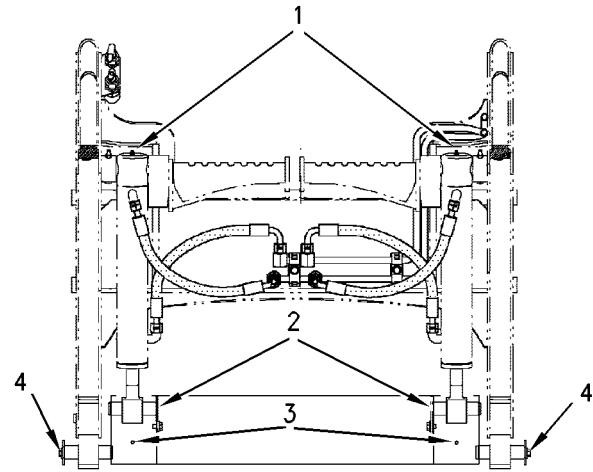


Illustration 215

g00955895

Note: Lubricate the fittings with the loader lift arms in the fully lowered position.

Apply lubricant to the grease fittings (1) for the upper bearings for the tilt cylinders.

Apply lubricant to the grease fittings (2) for the lower bearings for the tilt cylinders.

Apply lubricant to the grease fittings (3) for the coupler engagement pins.

Apply lubricant to the grease fitting (4) for the pivot pin of the quick coupler assembly.

There are a total of 8 grease fittings.

i02124717

Tire Inflation - Check

SMCS Code: 4203-535-AI

Measure the tire pressure on each tire. Consult your Caterpillar dealer for the correct load rating and for the correct operating pressures. These correct load ratings and correct operating pressures can also be obtained from your tire dealer.

Inflate the tires, if necessary.

Tire Inflation with Air

WARNING

Use a self-attaching inflation chuck and stand behind the tread when inflating a tire.

Proper inflation equipment, and training in using the equipment, are necessary to avoid overinflation. A tire blowout or rim failure can result from improper or misused equipment.

Before inflating tire, install on the machine or put tire in restraining device.

NOTICE

Set the tire inflation equipment regulator at no more than 140 kPa (20 psi) over the recommended tire pressure.

Tire Inflation with Nitrogen

Caterpillar recommends the use of dry nitrogen gas for tire inflation and for tire pressure adjustments. This includes all machines with rubber tires. Nitrogen is an inert gas that will not aid combustion inside the tire.

WARNING

Proper nitrogen inflation equipment, and training in using the equipment, are necessary to avoid overinflation. A tire blowout or rim failure can result from improper or misused equipment and personal injury or death can occur.

A tire blowout and/or rim failure can occur if the inflation equipment is not used correctly, due to the fact that a fully charged nitrogen cylinder's pressure is approximately 15000 kPa (2200 psi).

There are other benefits to using nitrogen in addition to reducing the risk of an explosion. The use of nitrogen for tire inflation lessens the slow oxidation of the rubber. Use of nitrogen also slows gradual tire deterioration. This is especially important for tires that are expected to have a long service life of at least four years. Nitrogen reduces the corrosion of rim components. Nitrogen also reduces problems that result from disassembly.

WARNING

A tire blowout or a rim failure can cause personal injury.

Use a self-attaching inflation chuck and stand behind the tread when inflating a tire, to prevent personal injury.

NOTICE

Set the tire inflation equipment regulator at no more than 140 kPa (20 psi) over the recommended tire pressure.

Use 6V - 4040 Inflation Group or an equivalent inflation group to inflate tires with a nitrogen gas cylinder.

Reference: For tire inflation instructions, refer to Special Instruction, SMHS7867, "Nitrogen Tire Inflation Group".

For nitrogen inflation, use the same tire pressures that are used for air inflation. Consult your tire dealer for operating pressures.

i01445212

Tire Segment - Replace (Removal)

SMCS Code: 4203-510-SEG

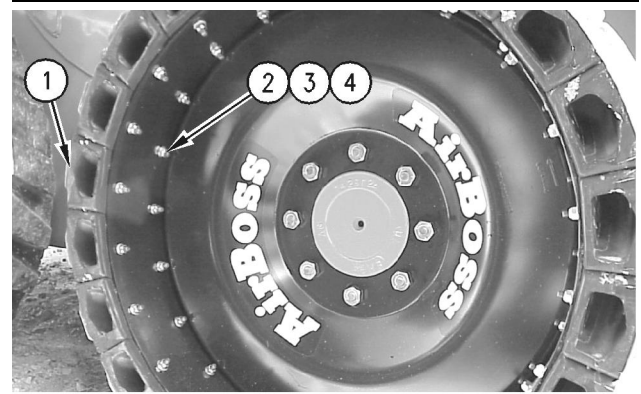


Illustration 216

g00756820

1. Remove any dirt buildup from the segment (1). Remove any dirt buildup from the stud threads (2).
2. Remove the locknuts (3) and washers (4). There are four locknuts and washers per segment.
3. Remove the segment from the rim.

Installation

1. Clean the inner surface of the rim. Clean the outer surface of the rim.
2. Align the studs in the segment with the holes in the rim. Install the segment, the washers and the locknuts.

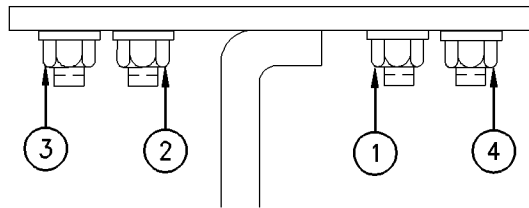


Illustration 217

g00756806

3. Tighten the locknuts (1), (2), (3) and (4) in order. Refer to the table below for the correct torque.

Table 32

The Recommended Torques for the Locknuts	
All Sizes Except 19.5L-24 & 17.5-25	19.5L-24 & 17.5-25
15 ± 1 N·m (11 ± 1 lb ft)	35 ± 1 N·m (26 ± 1 lb ft)

Wheel Nuts - Tighten

SMCS Code: 4210-527

Check the torque on new wheels or reinstalled wheels after every one service hour until the specified torque is maintained. After the specified torque is maintained, check the torque on the nuts after every ten service hours or every day.

Check the nuts on all four wheels. Use a star pattern when you are tightening the nuts.

The torque specifications are given in the following table.

Table 33

Tightening Torque for Wheels	
Airboss and Solid Tires	163 ± 7 N·m (120 ± 5 lb ft)
Pneumatic Tires	149 ± 7 N·m (110 ± 5 lb ft)

Window Washer Reservoir - Fill (If Equipped)

SMCS Code: 7306-544-KE

NOTICE

When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

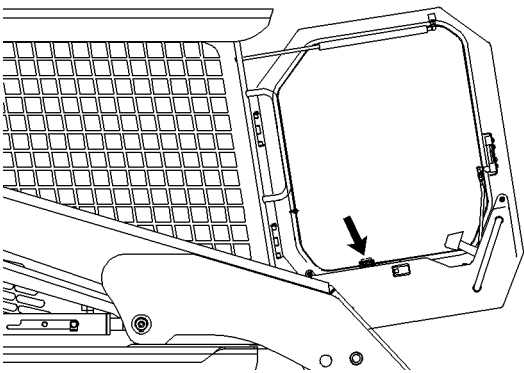


Illustration 218

g00925106

Fill the reservoir with window washer solvent.

Window Wiper - Inspect/Replace (If Equipped)

SMCS Code: 7305-040; 7305-510

Inspect the condition of the windshield wiper blade. Replace the windshield wiper blade if the windshield wiper blade is worn or damaged. If the window wiper blade streaks the window, replace the window wiper blade.

Windows - Clean (If Equipped)

SMCS Code: 7310-070

Use commercially available window cleaning solutions in order to clean the windows. Clean the outside of the windows from the ground unless handholds are available.

i02107645

Work Tool - Lubricate

SMCS Code: 6700-086

Multipurpose Bucket

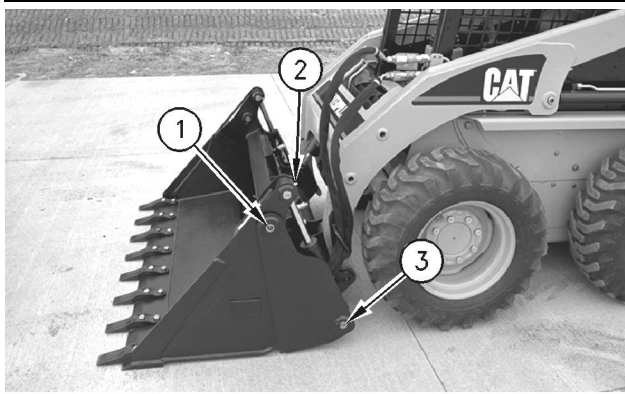


Illustration 219

g00534457

Apply lubricant to the grease fitting (1) for the pivot pin of the apron.

Apply lubricant to the grease fitting (2) for the rod end of the multipurpose bucket cylinder.

Apply lubricant to the grease fitting (3) for the head end of the multipurpose bucket cylinder.

Repeat for the other side of the bucket.

There are six grease fittings.

Utility Grapple Bucket and Utility Grapple Fork

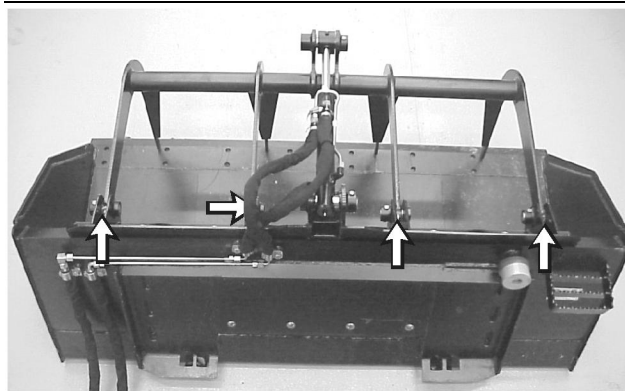


Illustration 220

g00647980

Apply lubricant to the four grease fittings for the grapples.

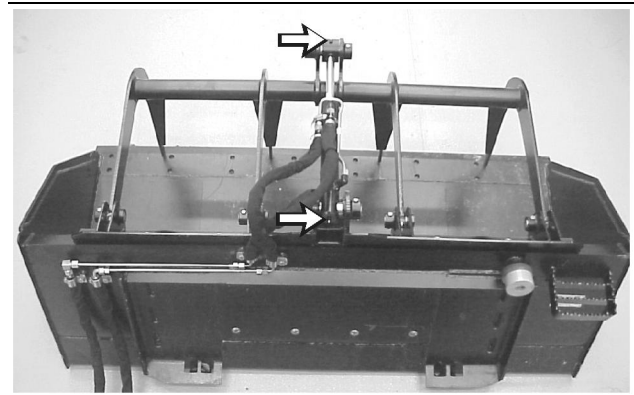


Illustration 221

g00647988

Apply lubricant to the two fittings for the grapple cylinder.

There are six grease fittings.

Industrial Grapple Bucket and Industrial Grapple Fork

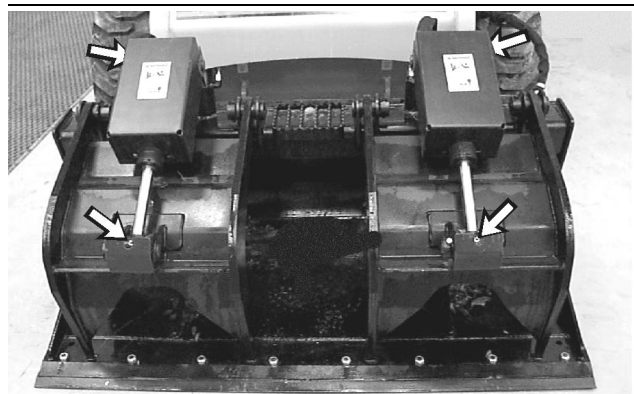


Illustration 222

g00645995

Apply lubricant to the four grease fittings for the fork cylinders.



Illustration 223

g00646004

Apply lubricant to the four grease fittings for the two forks.

There are eight grease fittings.

Angle Blade

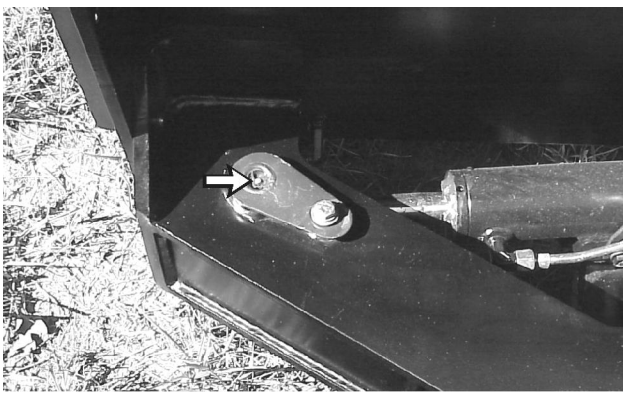


Illustration 224

g00648033

Apply lubricant to the grease fitting on the rod end of the angle cylinder.

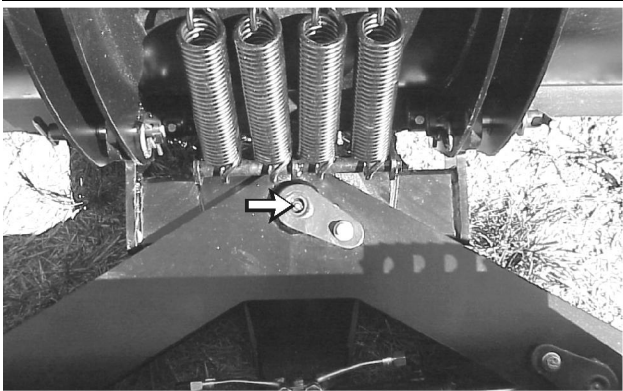


Illustration 225

g00648037

Apply lubricant to the grease fitting on the horizontal pivot point of the blade.

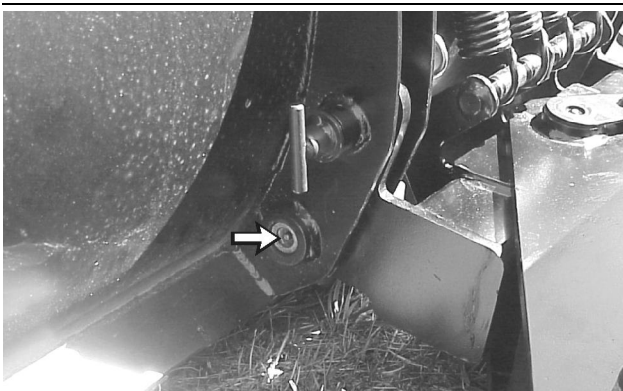


Illustration 226

g00648038

Apply lubricant to the grease fitting on the vertical pivot point of the blade. Repeat for opposite side of the blade.

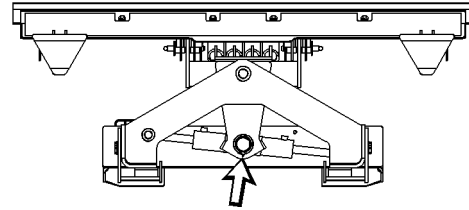


Illustration 227

g00677570

This is a bottom view of the angle blade.

Apply lubricant to the grease fitting on the pivot point of the cylinder.

There are five grease fittings.

Dozer Blade

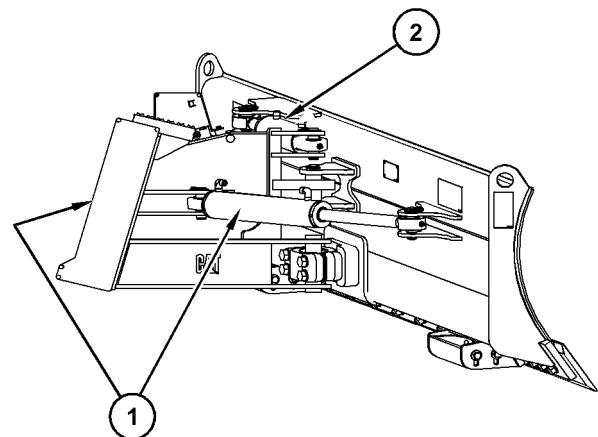


Illustration 228

g01073259

Apply lubricant to the grease fitting on both ends of the right hand angle cylinder (1). Repeat for opposite side of the blade.

Apply lubricant to the grease fitting on the pivot points on each end of the tilt cylinder (2).

There are six grease fittings.

i01809997

Work Tool Mounting Bracket - Inspect

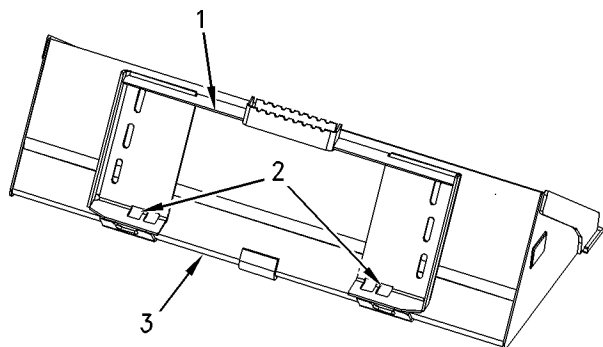
SMCS Code: 6700-040-BK

Illustration 229

g00925058

Inspect upper angled plate (1) and ensure that the plate is not bent or otherwise damaged. Inspect holes (2) for wear and for damage. Inspect lower angled plate (3) and ensure that the plate is not bent or otherwise damaged. If any wear is suspected or any damage is suspected, consult your Caterpillar dealer before you use the work tool.